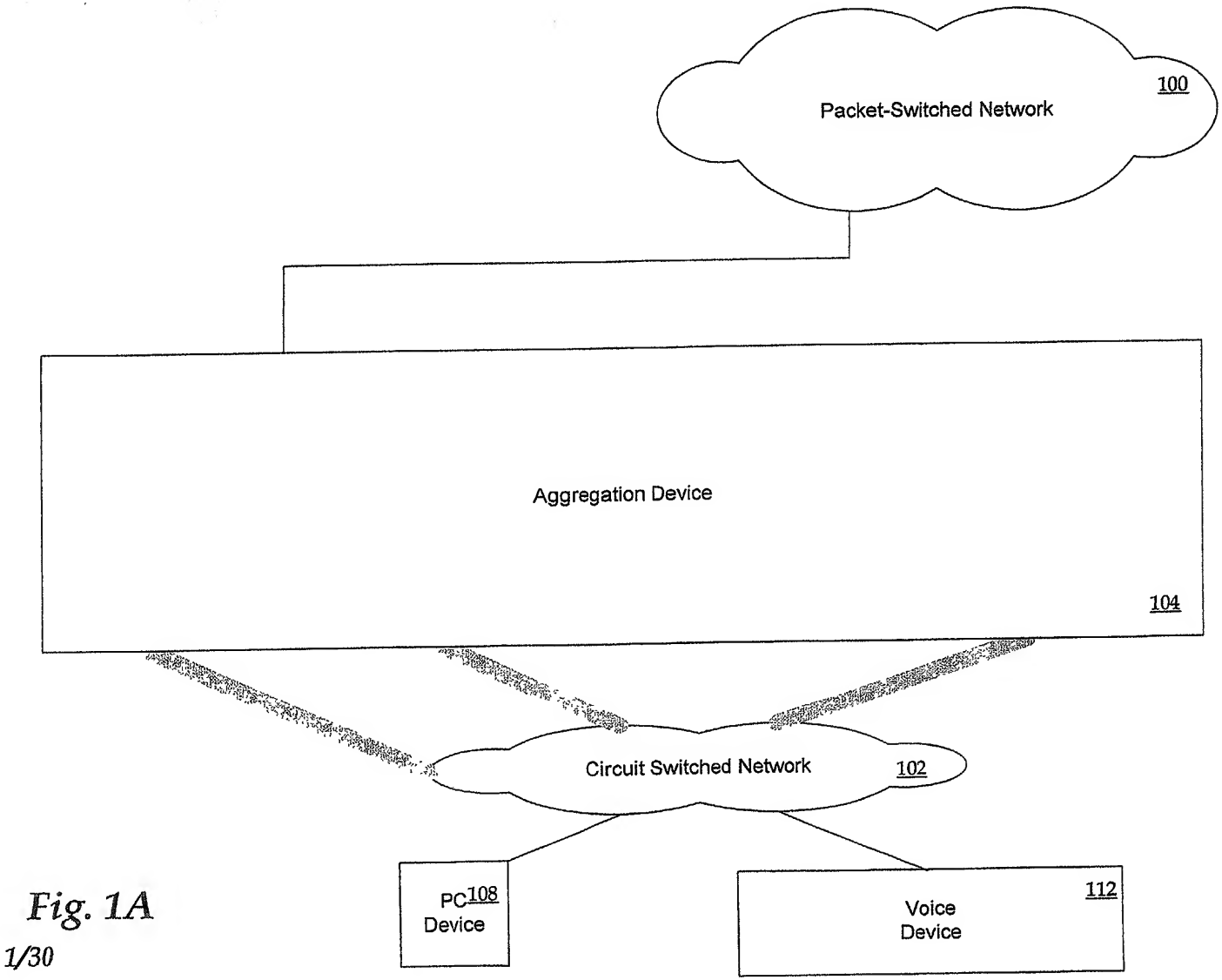
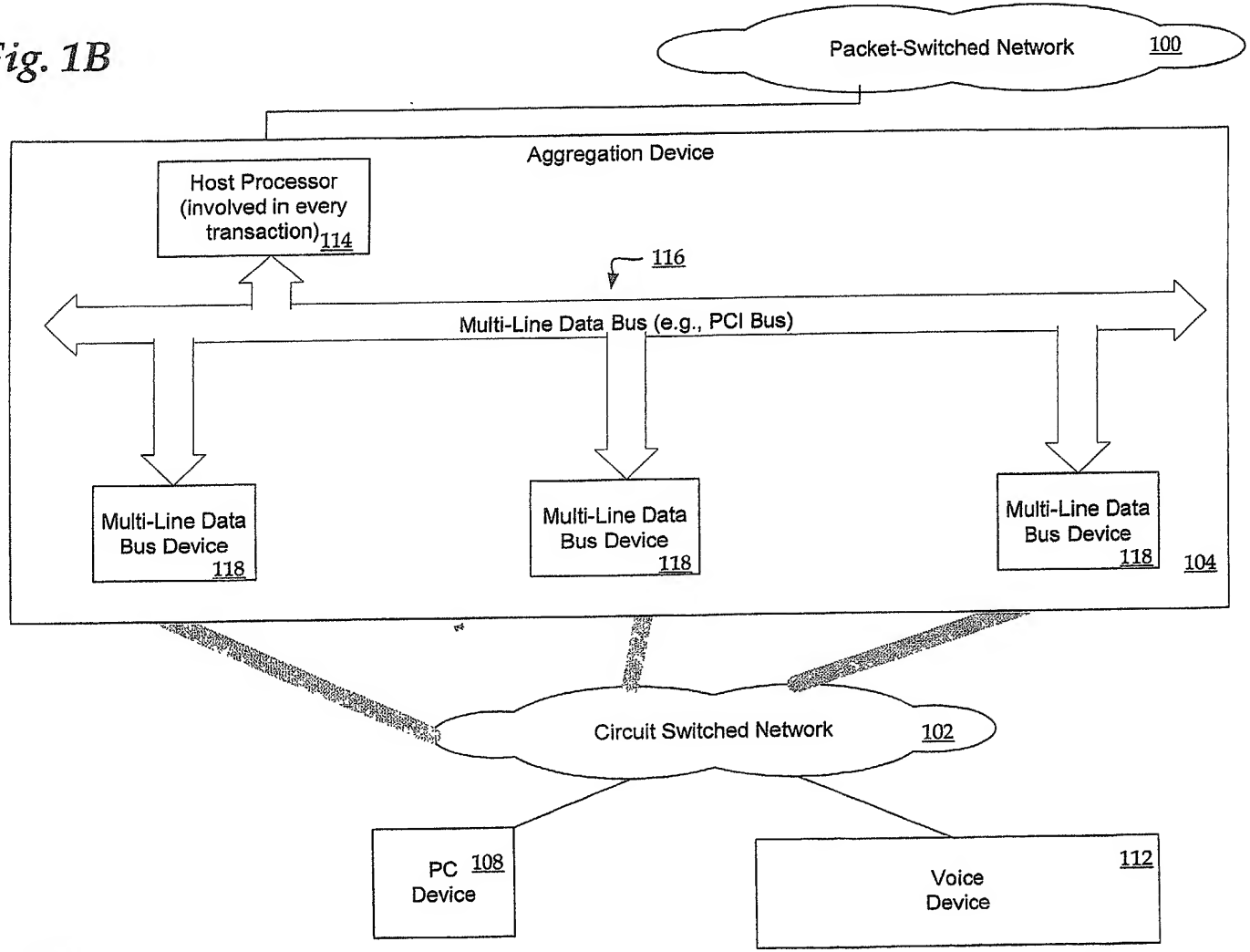


Fig. 1A

Fig. 1B


Packet-Switched Network
100
Aggregation Device
Host Processor
(involved in every
transaction)
114
116
Multi-Line Data Bus (e.g., PCI Bus)
Multi-Line Data
Bus Device
118
Multi-Line Data
Bus Device
118
Multi-Line Data
Bus Device
118
104
Circuit Switched Network
102
PC
Device
108
Voice
Device
112

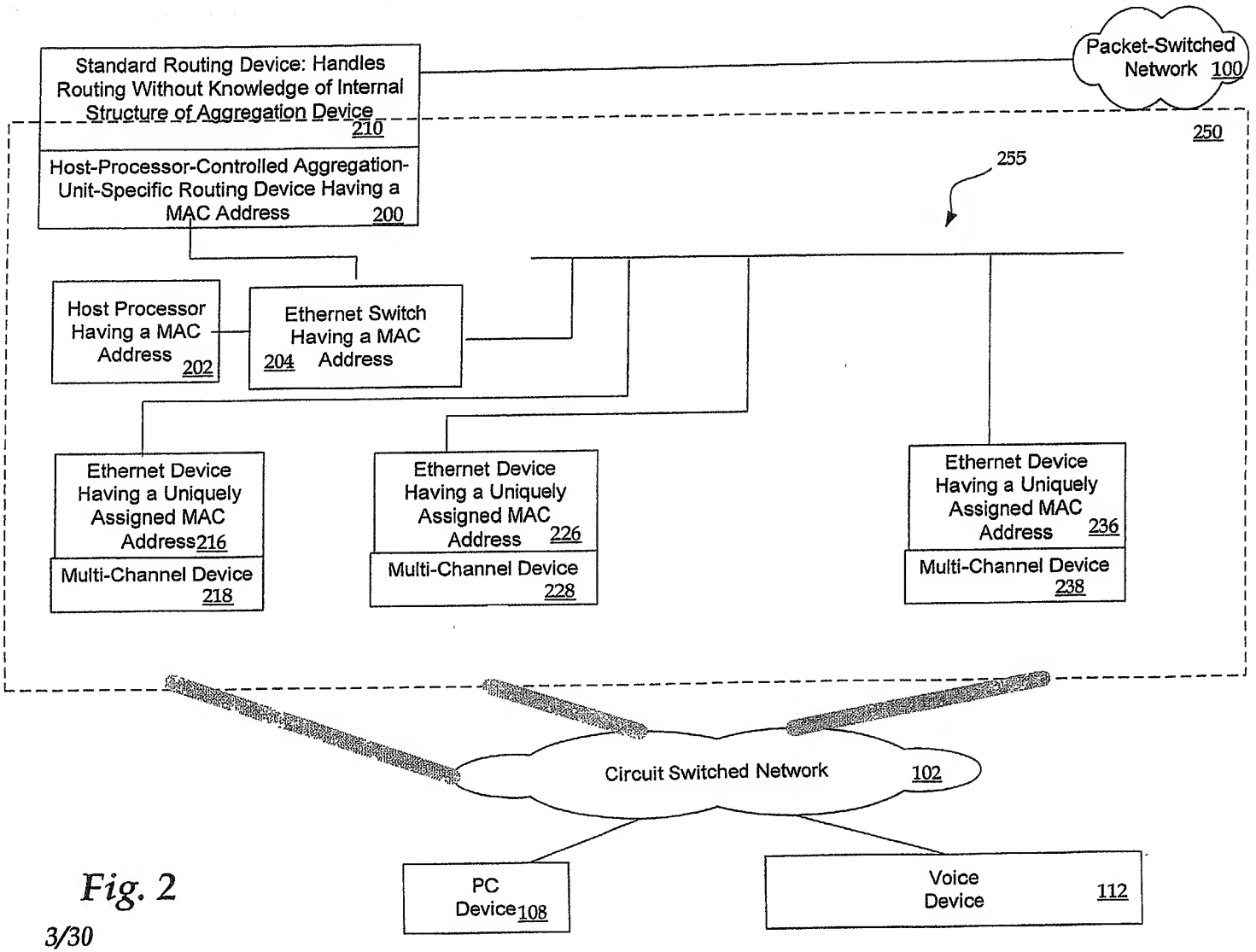
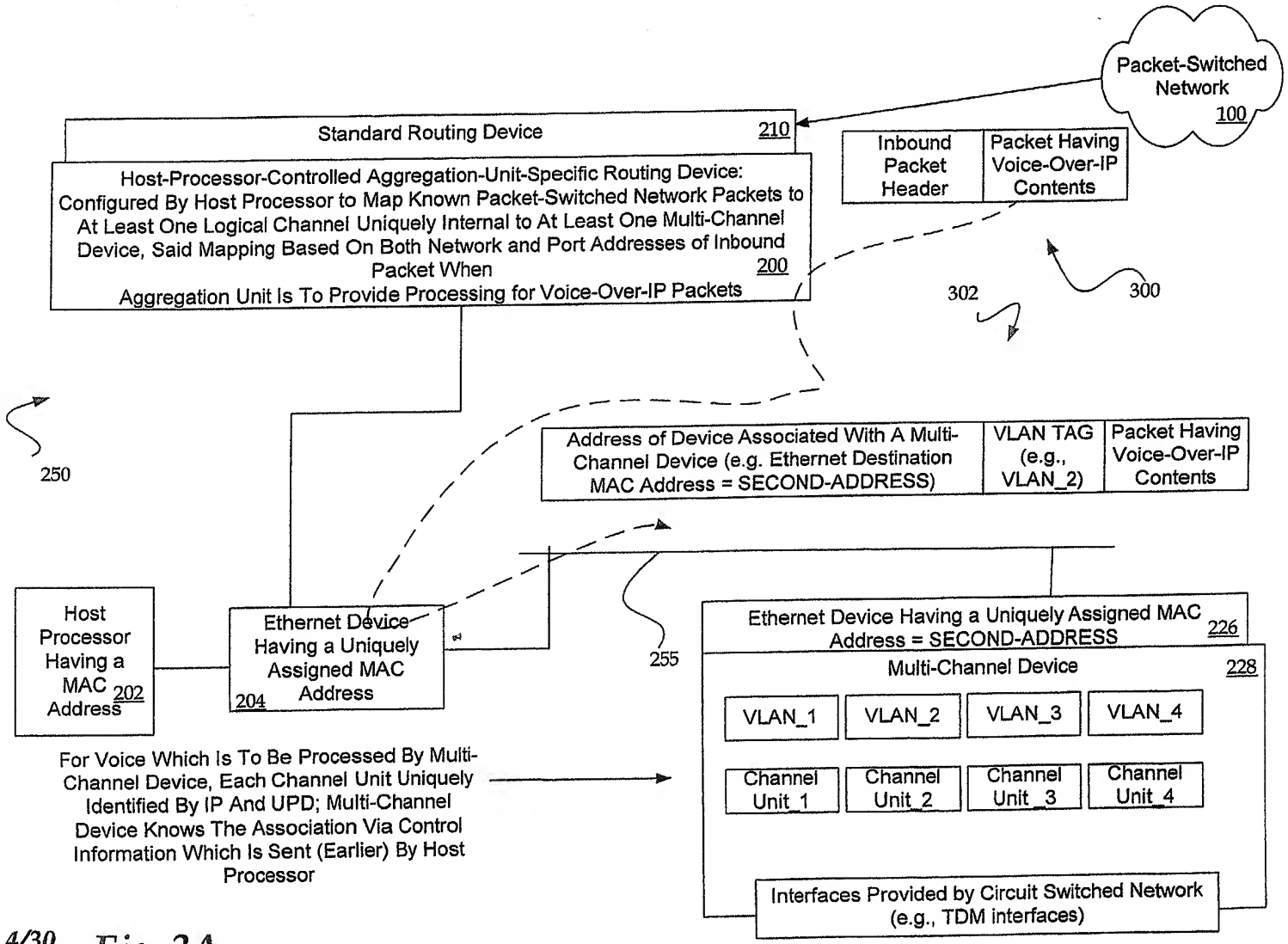
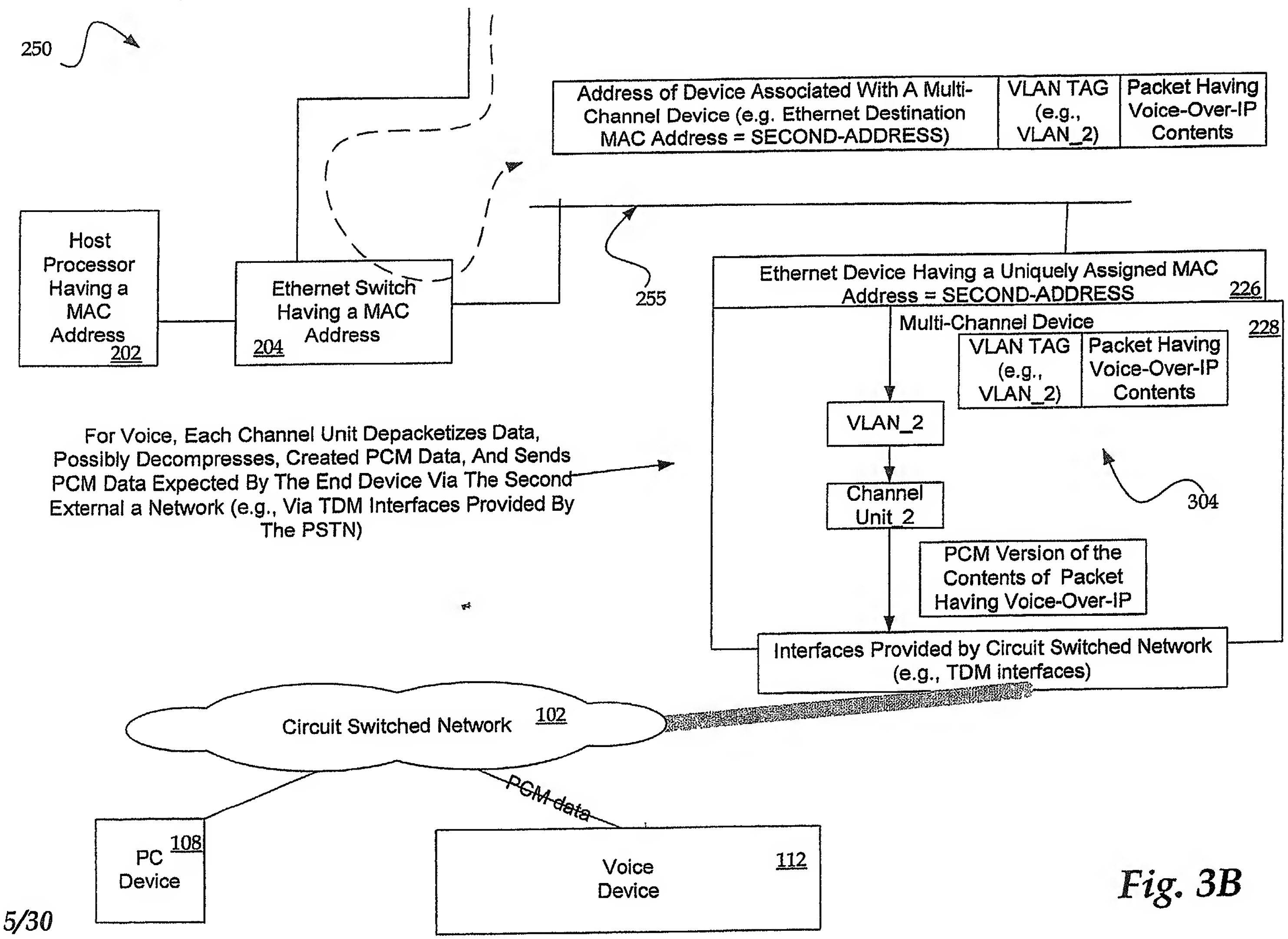


Fig. 2


Packet-Switched Network
100
Standard Routing Device
210
Host-Processor-Controlled Aggregation-Unit-Specific Routing Device: Configured By Host Processor to Map Known Packet-Switched Network Packets to At Least One Logical Channel Uniquely Internal to At Least One Multi-Channel Device, Said Mapping Based On Both Network and Port Addresses of Inbound Packet When Aggregation Unit Is To Provide Processing for Voice-Over-IP Packets
200
Inbound Packet Header
Packet Having Voice-Over-IP Contents
302
300
250
Address of Device Associated With A Multi-Channel Device (e.g. Ethernet Destination MAC Address = SECOND-ADDRESS)
VLAN TAG (e.g., VLAN_2)
Packet Having Voice-Over-IP Contents
Host Processor Having a MAC Address
202
Ethernet Device Having a Uniquely Assigned MAC Address
204
255
Ethernet Device Having a Uniquely Assigned MAC Address = SECOND-ADDRESS
226
Multi-Channel Device
228
VLAN_1
VLAN_2
VLAN_3
VLAN_4
Channel Unit_1
Channel Unit_2
Channel Unit_3
Channel Unit_4
Interfaces Provided by Circuit Switched Network (e.g., TDM interfaces)
For Voice Which Is To Be Processed By Multi-Channel Device, Each Channel Unit Uniquely Identified By IP And UPD; Multi-Channel Device Knows The Association Via Control Information Which Is Sent (Earlier) By Host Processor

4/30 *Fig. 3A*



250
Host Processor Having a MAC Address 202
Ethernet Switch Having a MAC Address 204
Address of Device Associated With A Multi-Channel Device (e.g. Ethernet Destination MAC Address = SECOND-ADDRESS)
VLAN TAG (e.g., VLAN_2)
Packet Having Voice-Over-IP Contents
255
Ethernet Device Having a Uniquely Assigned MAC Address = SECOND-ADDRESS 226
Multi-Channel Device 228
VLAN TAG (e.g., VLAN_2)
Packet Having Voice-Over-IP Contents
VLAN_2
Channel Unit_2
304
PCM Version of the Contents of Packet Having Voice-Over-IP
Interfaces Provided by Circuit Switched Network (e.g., TDM interfaces)
For Voice, Each Channel Unit Depacketizes Data, Possibly Decompresses, Created PCM Data, And Sends PCM Data Expected By The End Device Via The Second External a Network (e.g., Via TDM Interfaces Provided By The PSTN)
Circuit Switched Network 102
PCM data
PC Device 108
Voice Device 112

Fig. 3B

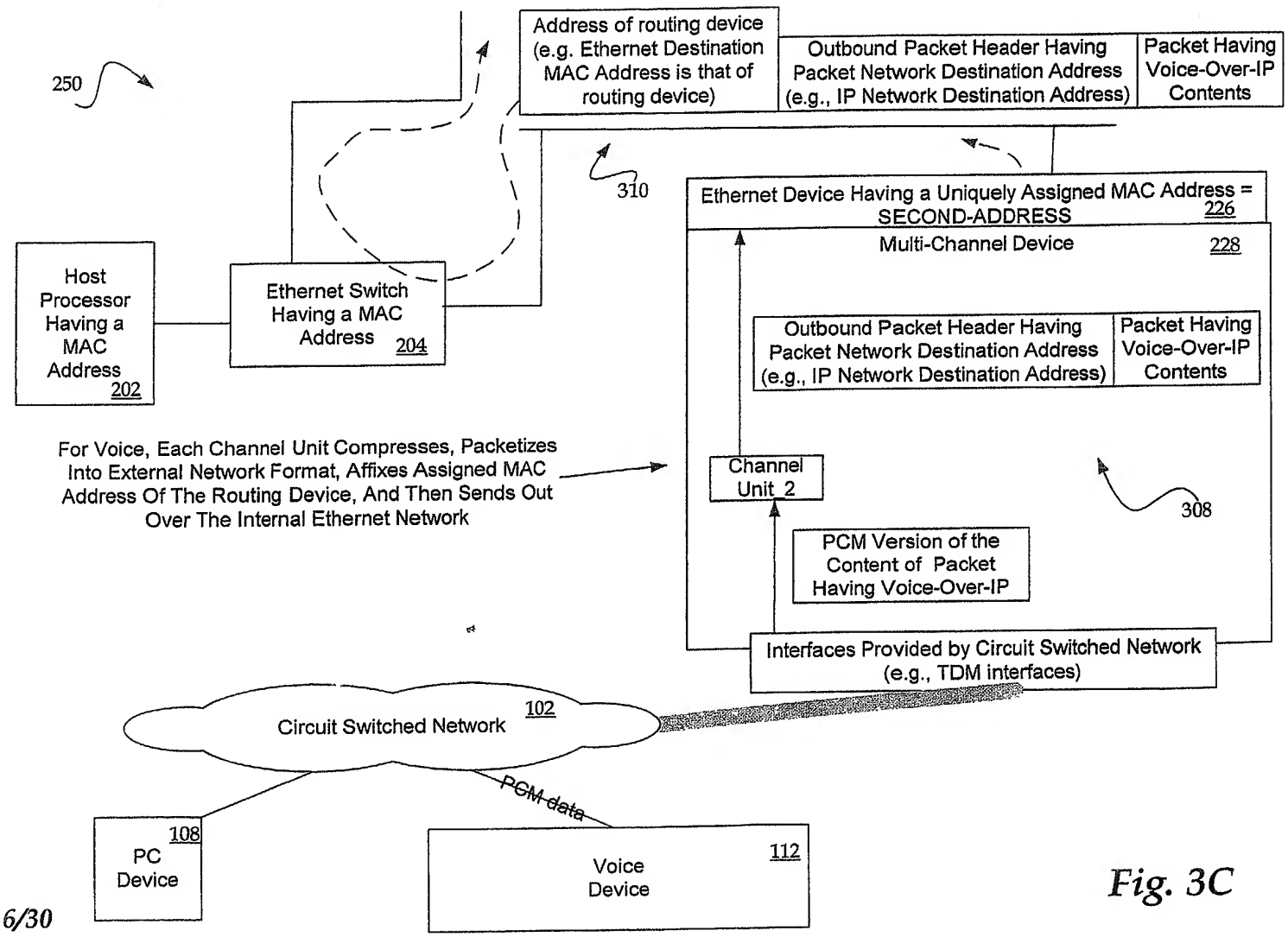
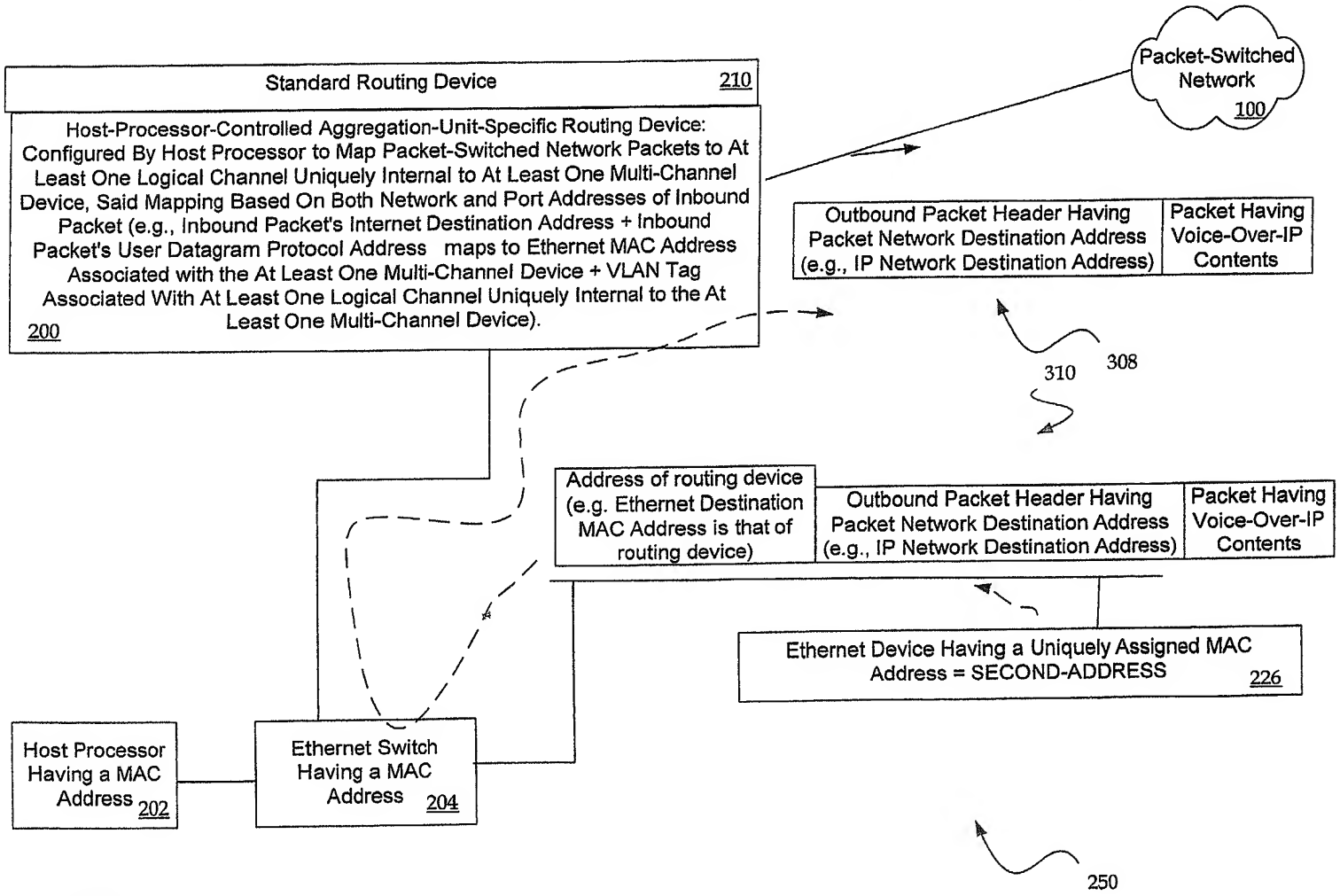

250
Address of routing device (e.g. Ethernet Destination MAC Address is that of routing device)
Outbound Packet Header Having Packet Network Destination Address (e.g., IP Network Destination Address)
Packet Having Voice-Over-IP Contents
310
Ethernet Device Having a Uniquely Assigned MAC Address = SECOND-ADDRESS 226
Multi-Channel Device 228
Host Processor Having a MAC Address 202
Ethernet Switch Having a MAC Address 204
Outbound Packet Header Having Packet Network Destination Address (e.g., IP Network Destination Address)
Packet Having Voice-Over-IP Contents
For Voice, Each Channel Unit Compresses, Packetizes Into External Network Format, Affixes Assigned MAC Address Of The Routing Device, And Then Sends Out Over The Internal Ethernet Network
Channel Unit_2
308
PCM Version of the Content of Packet Having Voice-Over-IP
Interfaces Provided by Circuit Switched Network (e.g., TDM interfaces)
Circuit Switched Network 102
PCM data
108
PC Device
112
Voice Device

Fig. 3C


Standard Routing Device 210
Host-Processor-Controlled Aggregation-Unit-Specific Routing Device: Configured By Host Processor to Map Packet-Switched Network Packets to At Least One Logical Channel Uniquely Internal to At Least One Multi-Channel Device, Said Mapping Based On Both Network and Port Addresses of Inbound Packet (e.g., Inbound Packet's Internet Destination Address + Inbound Packet's User Datagram Protocol Address maps to Ethernet MAC Address Associated with the At Least One Multi-Channel Device + VLAN Tag Associated With At Least One Logical Channel Uniquely Internal to the At Least One Multi-Channel Device).
200
Packet-Switched Network 100
Outbound Packet Header Having Packet Network Destination Address (e.g., IP Network Destination Address)
Packet Having Voice-Over-IP Contents
310
308
Address of routing device (e.g. Ethernet Destination MAC Address is that of routing device)
Outbound Packet Header Having Packet Network Destination Address (e.g., IP Network Destination Address)
Packet Having Voice-Over-IP Contents
Ethernet Device Having a Uniquely Assigned MAC Address = SECOND-ADDRESS 226
Host Processor Having a MAC Address 202
Ethernet Switch Having a MAC Address 204
250

7/30

Fig. 3D

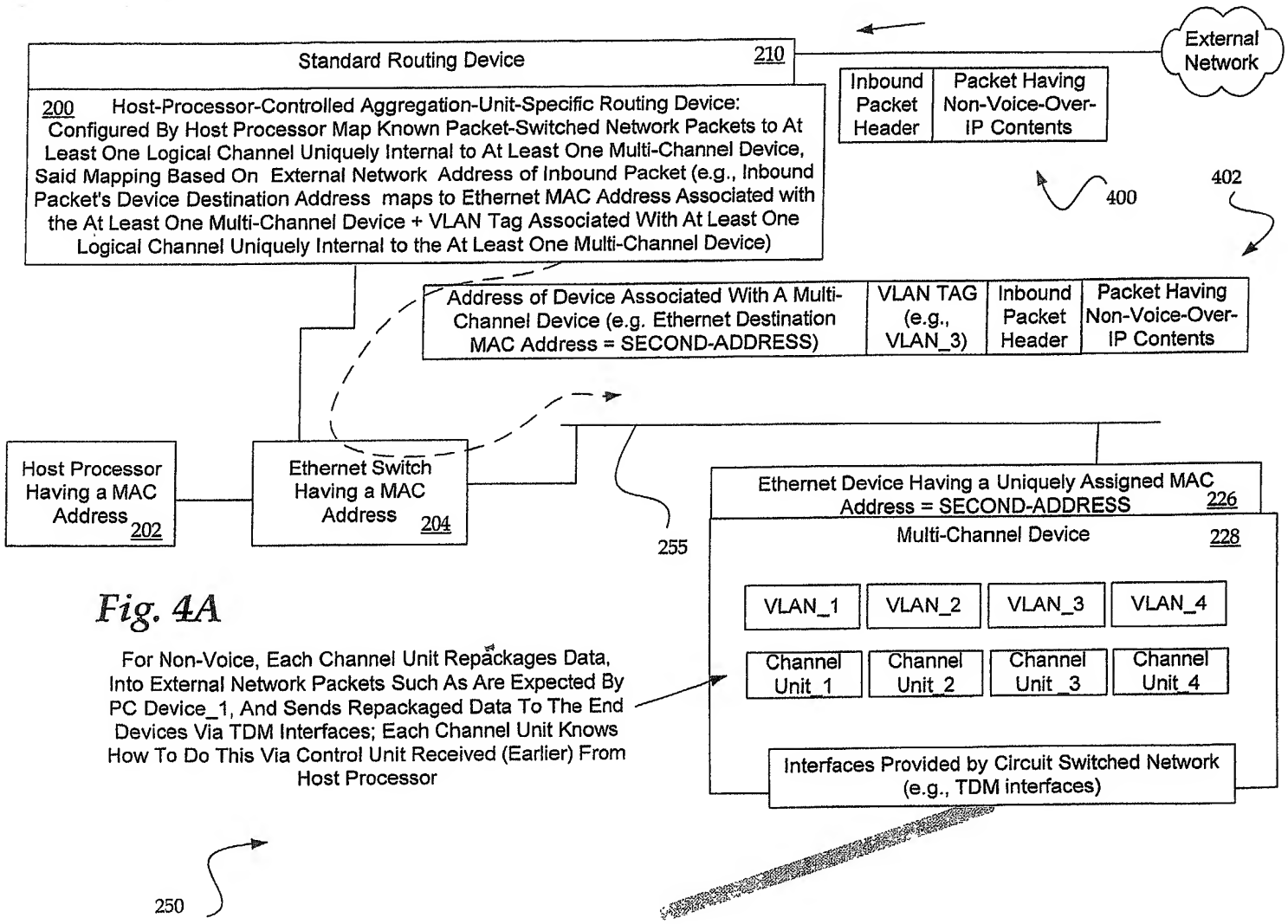
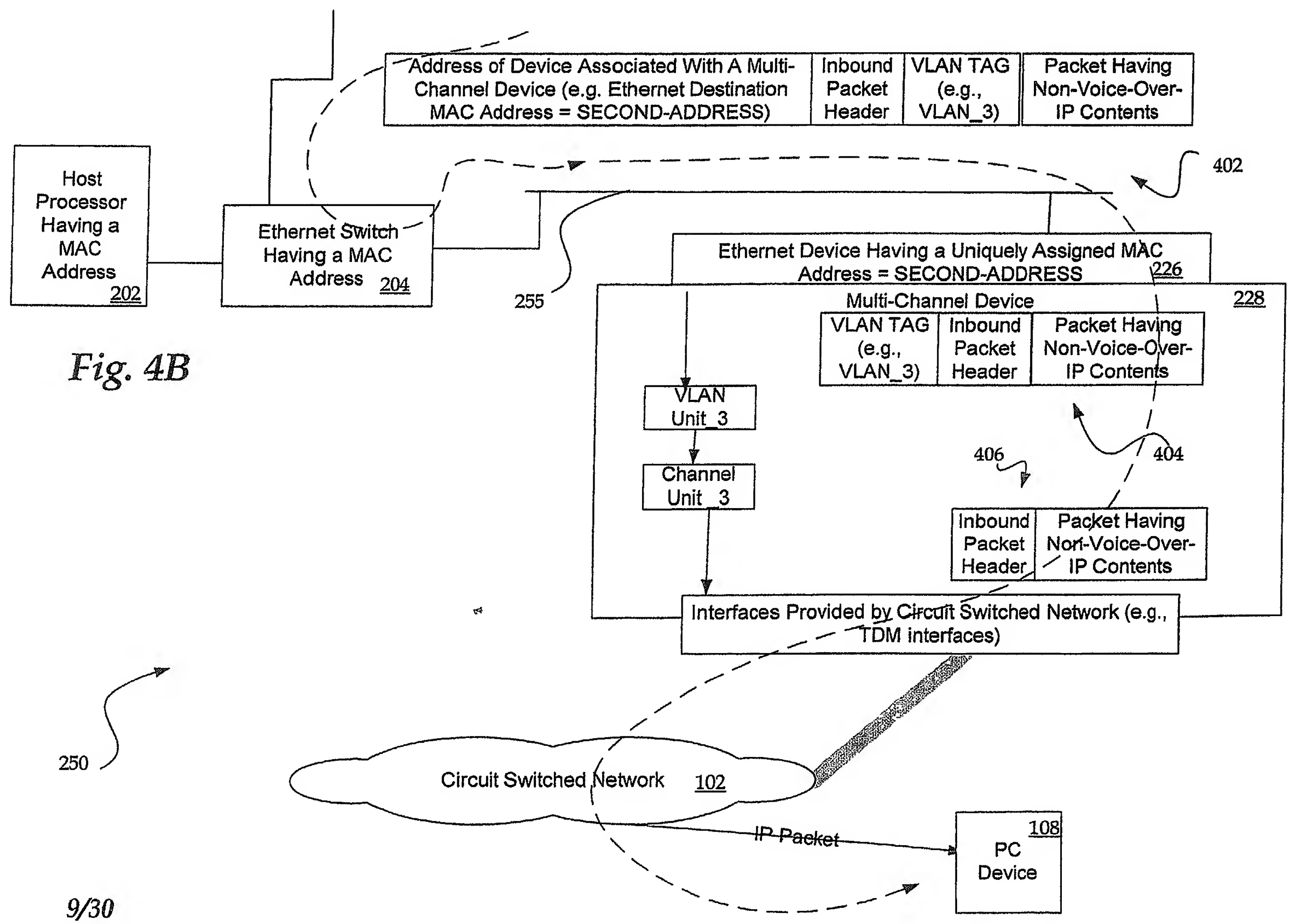

Standard Routing Device
210
200 Host-Processor-Controlled Aggregation-Unit-Specific Routing Device: Configured By Host Processor Map Known Packet-Switched Network Packets to At Least One Logical Channel Uniquely Internal to At Least One Multi-Channel Device, Said Mapping Based On External Network Address of Inbound Packet (e.g., Inbound Packet's Device Destination Address maps to Ethernet MAC Address Associated with the At Least One Multi-Channel Device + VLAN Tag Associated With At Least One Logical Channel Uniquely Internal to the At Least One Multi-Channel Device)
External Network
Inbound Packet Header
Packet Having Non-Voice-Over-IP Contents
400
402
Address of Device Associated With A Multi-Channel Device (e.g. Ethernet Destination MAC Address = SECOND-ADDRESS)
VLAN TAG (e.g., VLAN_3)
Inbound Packet Header
Packet Having Non-Voice-Over-IP Contents
Host Processor Having a MAC Address 202
Ethernet Switch Having a MAC Address 204
255
Ethernet Device Having a Uniquely Assigned MAC Address = SECOND-ADDRESS 226
Multi-Channel Device 228
VLAN_1
VLAN_2
VLAN_3
VLAN_4
Channel Unit_1
Channel Unit_2
Channel Unit_3
Channel Unit_4
Interfaces Provided by Circuit Switched Network (e.g., TDM interfaces)
For Non-Voice, Each Channel Unit Repackages Data, Into External Network Packets Such As Are Expected By PC Device_1, And Sends Repackaged Data To The End Devices Via TDM Interfaces; Each Channel Unit Knows How To Do This Via Control Unit Received (Earlier) From Host Processor
250

Fig. 4A



Host Processor Having a MAC Address 202
Ethernet Switch Having a MAC Address 204
Address of Device Associated With A Multi-Channel Device (e.g. Ethernet Destination MAC Address = SECOND-ADDRESS)
Inbound Packet Header
VLAN TAG (e.g., VLAN_3)
Packet Having Non-Voice-Over-IP Contents
402
255
Ethernet Device Having a Uniquely Assigned MAC Address = SECOND-ADDRESS 226
Multi-Channel Device
228
VLAN TAG (e.g., VLAN_3)
Inbound Packet Header
Packet Having Non-Voice-Over-IP Contents
VLAN Unit_3
Channel Unit_3
406
404
Inbound Packet Header
Packet Having Non-Voice-Over-IP Contents
Interfaces Provided by Circuit Switched Network (e.g., TDM interfaces)
250
Circuit Switched Network 102
IP Packet
PC Device 108

Fig. 4B

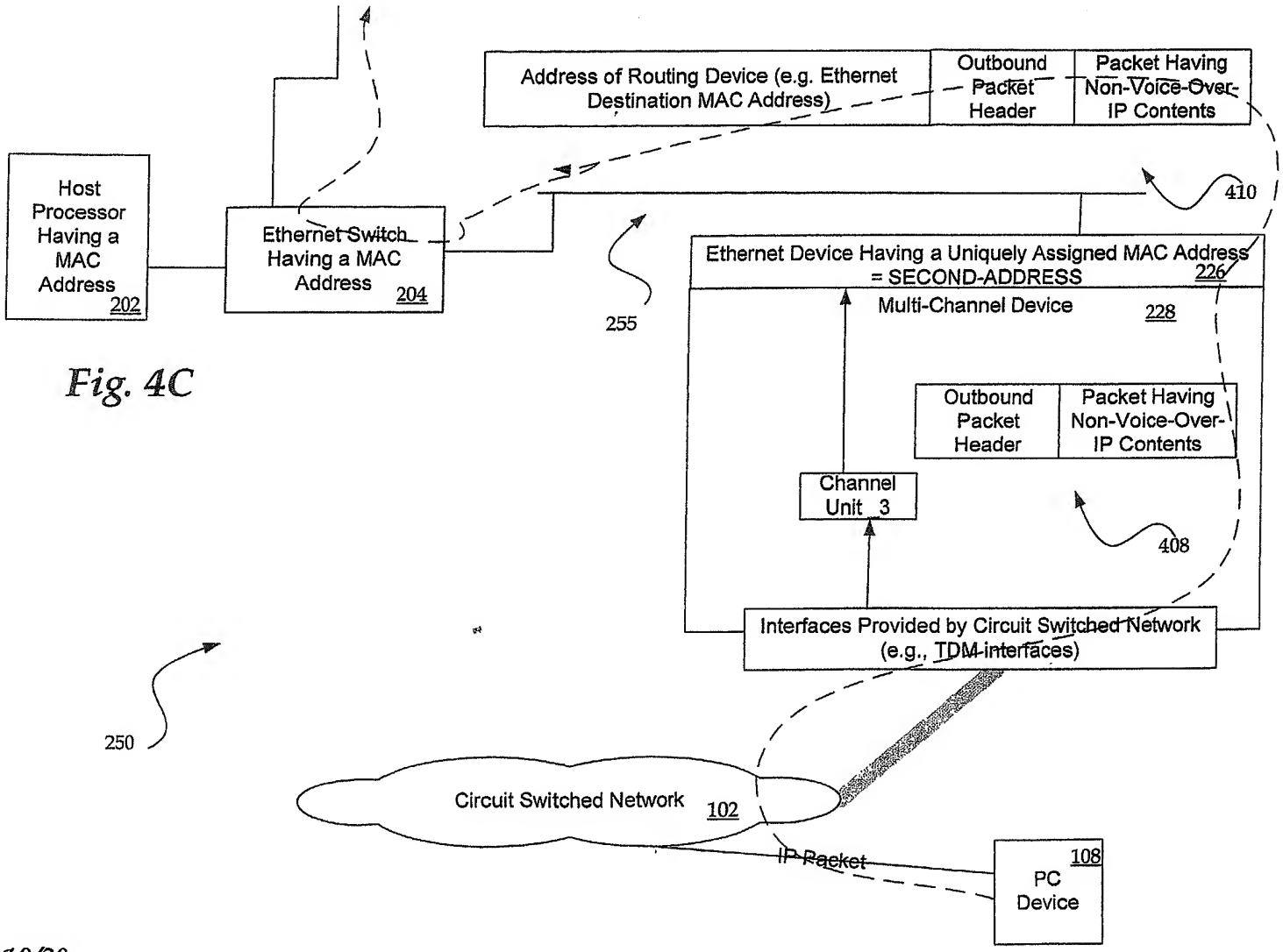
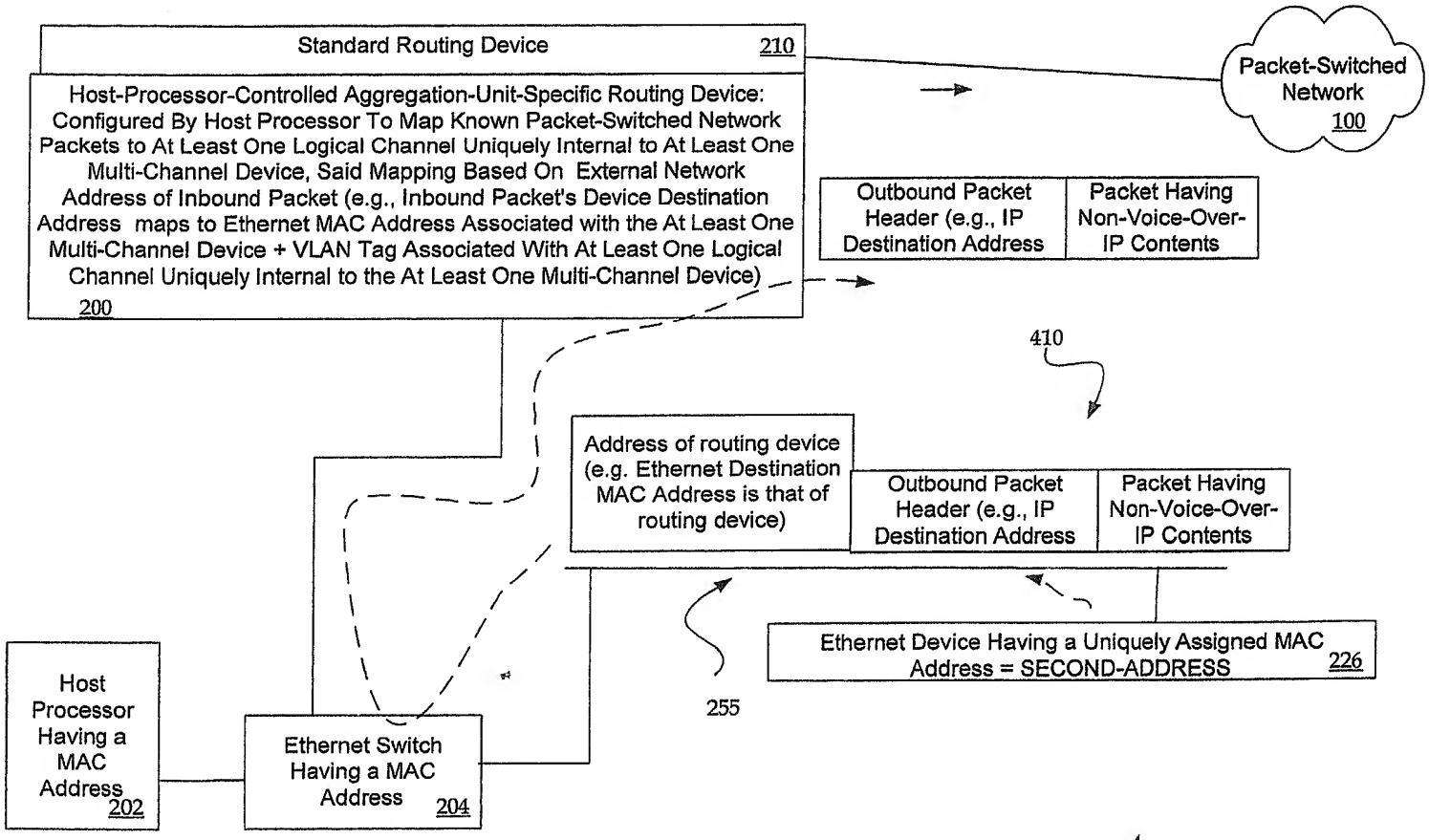

Address of Routing Device (e.g. Ethernet Destination MAC Address)
Outbound Packet Header
Packet Having Non-Voice-Over-IP Contents
Host Processor Having a MAC Address 202
Ethernet Switch Having a MAC Address 204
410
255
Ethernet Device Having a Uniquely Assigned MAC Address = SECOND-ADDRESS 226
Multi-Channel Device 228
Outbound Packet Header
Packet Having Non-Voice-Over-IP Contents
Channel Unit_3
408
Interfaces Provided by Circuit Switched Network (e.g., TDM-interfaces)
250
Circuit Switched Network 102
IP Packet
108
PC Device

Fig. 4C



11/30

Fig. 4D

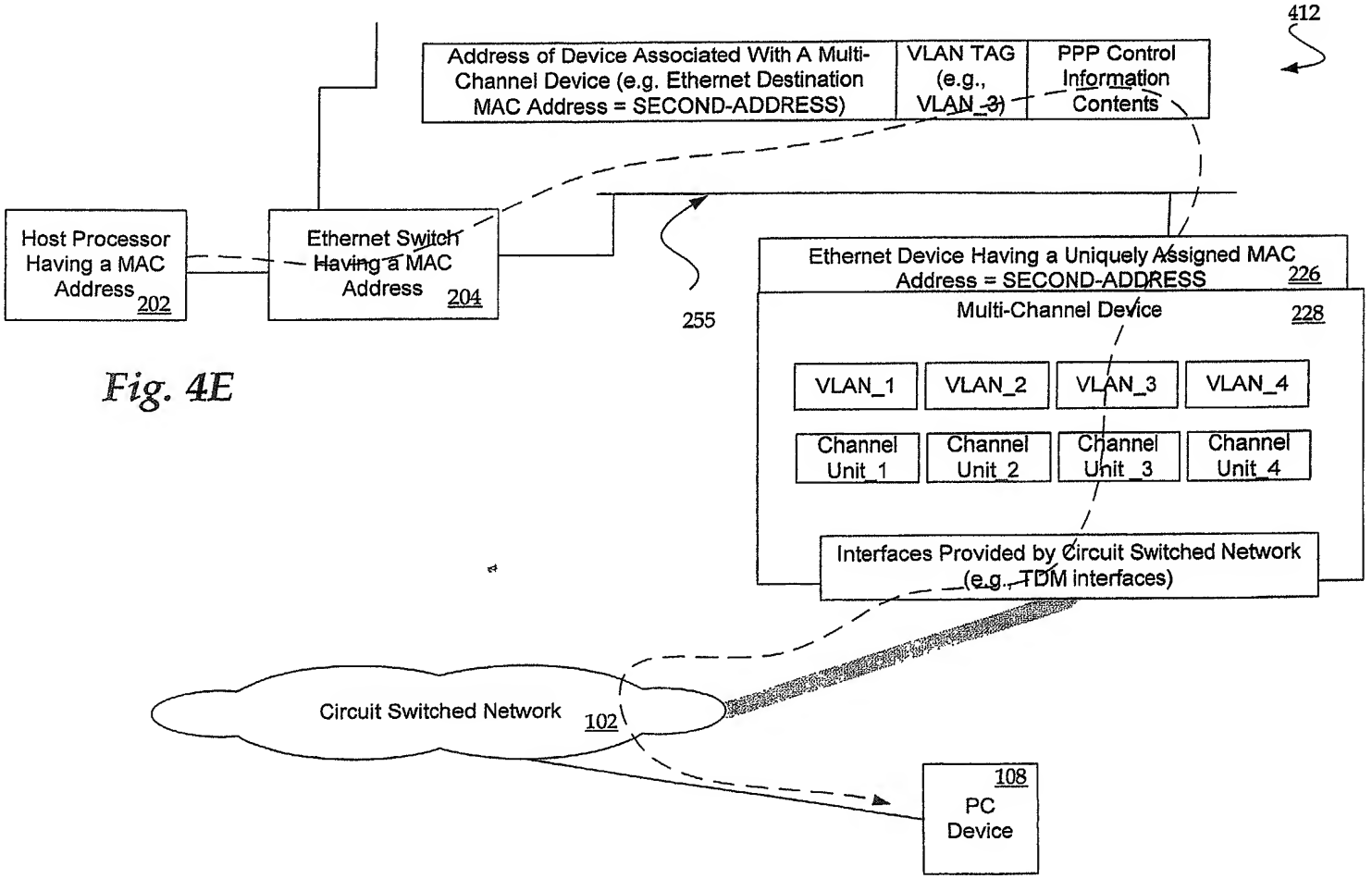

412
Address of Device Associated With A Multi-Channel Device (e.g. Ethernet Destination MAC Address = SECOND-ADDRESS)
VLAN TAG (e.g., VLAN_3)
PPP Control Information Contents
Host Processor Having a MAC Address 202
Ethernet Switch Having a MAC Address 204
255
Ethernet Device Having a Uniquely Assigned MAC Address = SECOND-ADDRESS 226
Multi-Channel Device 228
VLAN_1
VLAN_2
VLAN_3
VLAN_4
Channel Unit_1
Channel Unit_2
Channel Unit_3
Channel Unit_4
Interfaces Provided by Circuit Switched Network (e.g., TDM interfaces)
Circuit Switched Network 102
108
PC Device

Fig. 4E

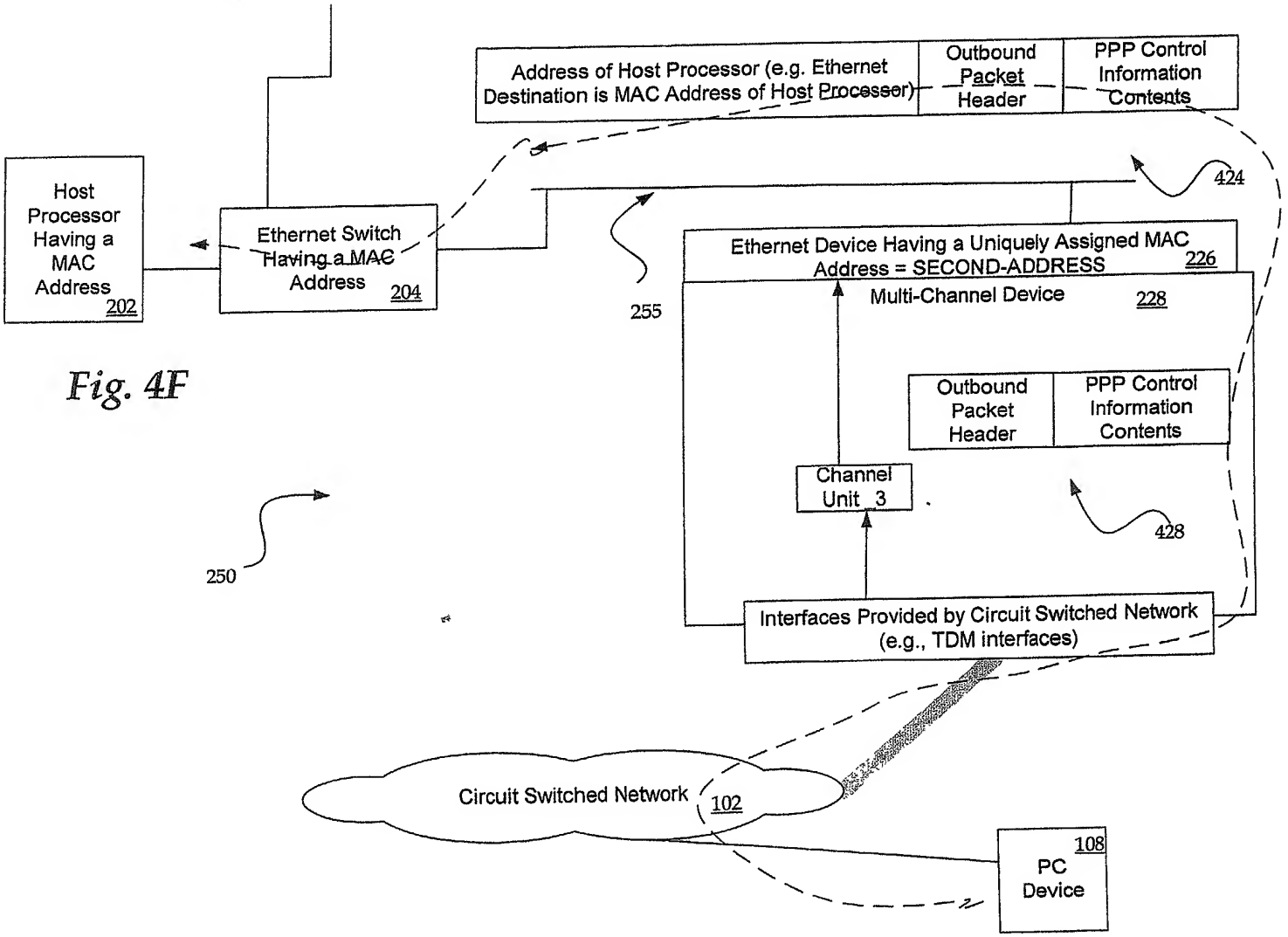

Address of Host Processor (e.g. Ethernet Destination is MAC Address of Host Processor)
Outbound Packet Header
PPP Control Information Contents
424
Host Processor Having a MAC Address 202
Ethernet Switch Having a MAC Address 204
255
Ethernet Device Having a Uniquely Assigned MAC Address = SECOND-ADDRESS 226
Multi-Channel Device 228
Outbound Packet Header
PPP Control Information Contents
Channel Unit 3
428
250
Interfaces Provided by Circuit Switched Network (e.g., TDM interfaces)
Circuit Switched Network 102
108
PC Device

Fig. 4F

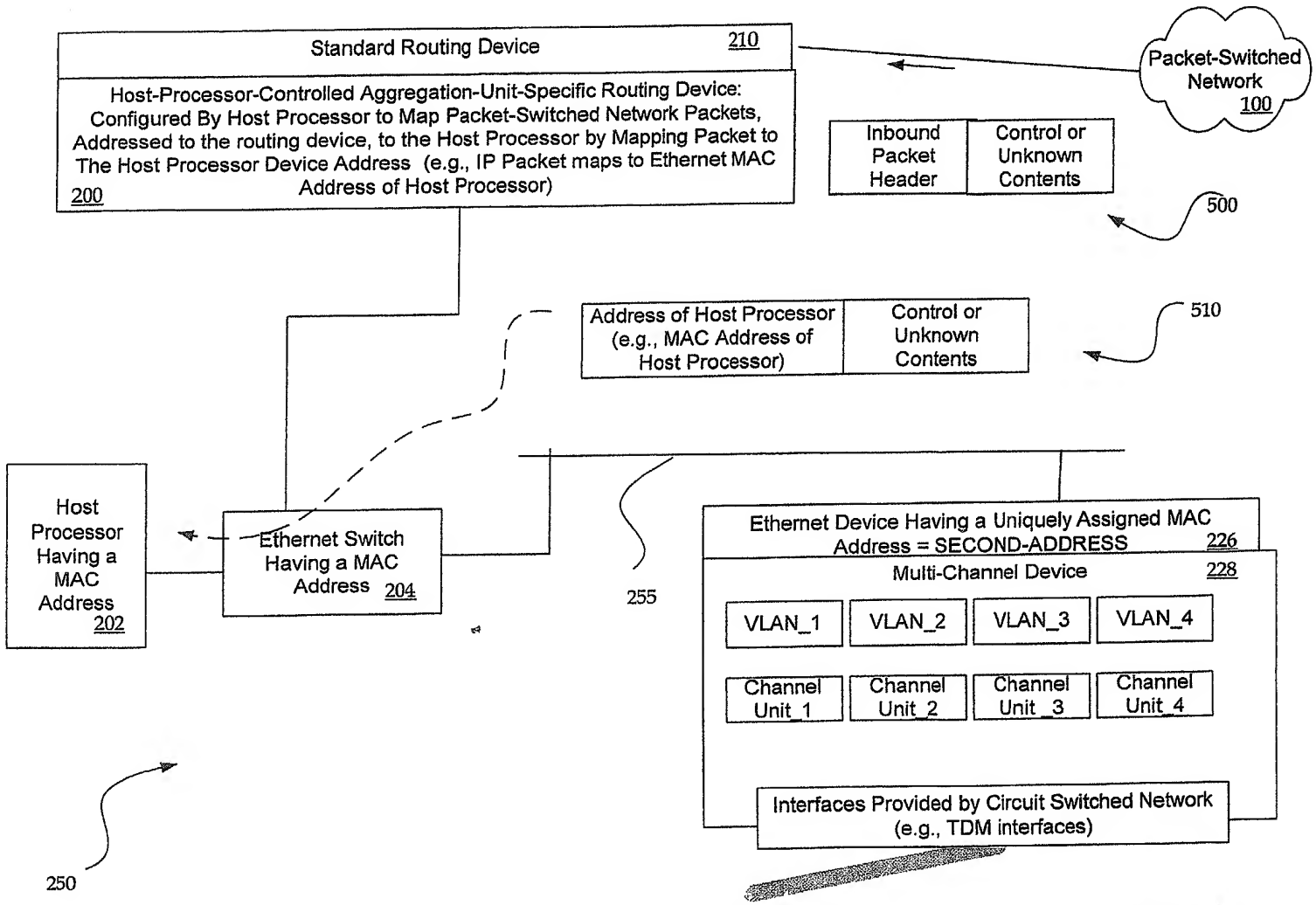

Standard Routing Device
210
Host-Processor-Controlled Aggregation-Unit-Specific Routing Device: Configured By Host Processor to Map Packet-Switched Network Packets, Addressed to the routing device, to the Host Processor by Mapping Packet to The Host Processor Device Address (e.g., IP Packet maps to Ethernet MAC Address of Host Processor)
200
Packet-Switched Network
100
Inbound Packet Header
Control or Unknown Contents
500
Address of Host Processor (e.g., MAC Address of Host Processor)
Control or Unknown Contents
510
Host Processor Having a MAC Address
202
Ethernet Switch Having a MAC Address
204
255
Ethernet Device Having a Uniquely Assigned MAC Address = SECOND-ADDRESS
226
Multi-Channel Device
228
VLAN_1
VLAN_2
VLAN_3
VLAN_4
Channel Unit_1
Channel Unit_2
Channel Unit_3
Channel Unit_4
Interfaces Provided by Circuit Switched Network (e.g., TDM interfaces)
250

Fig. 5

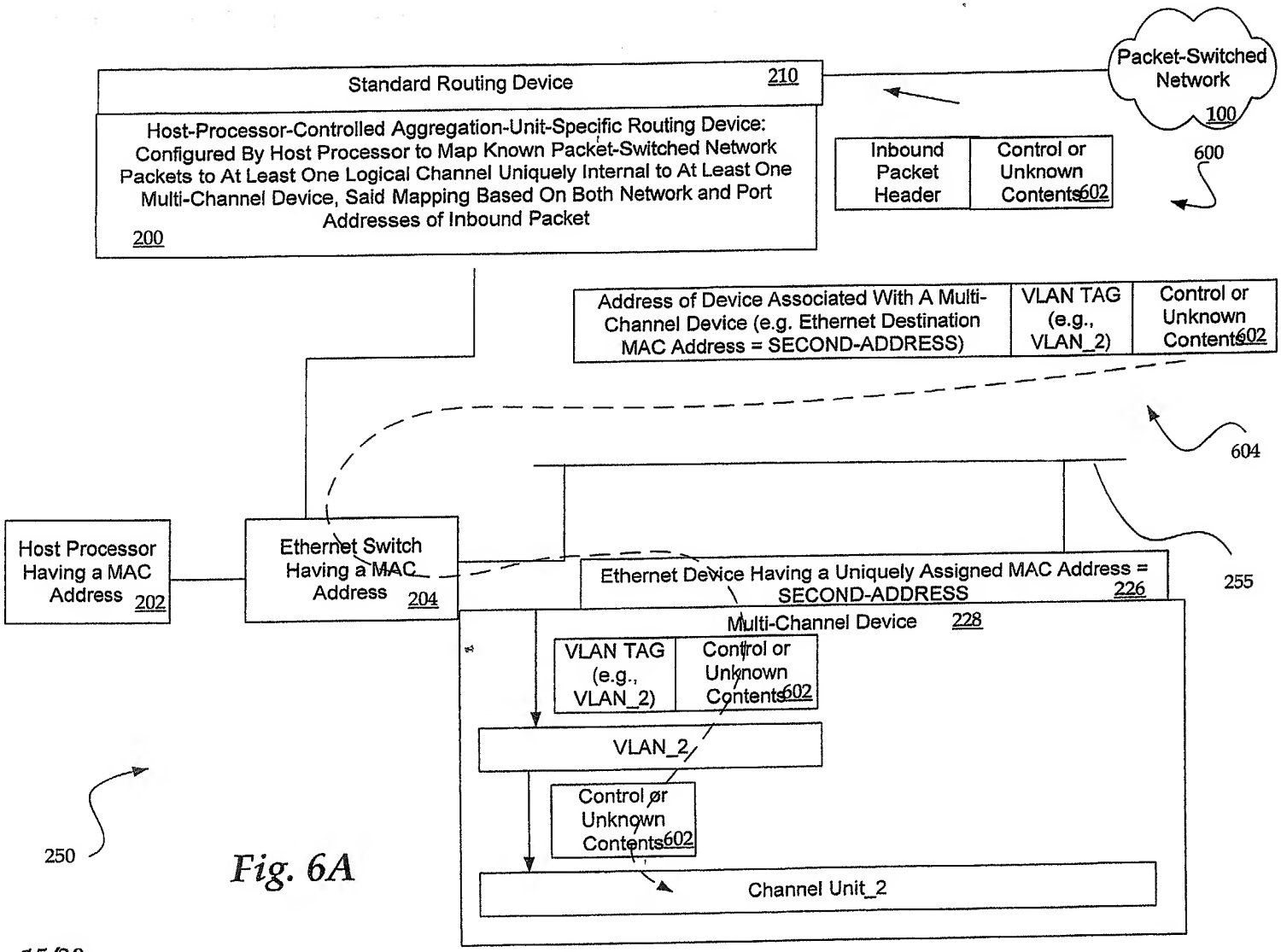


Fig. 6A

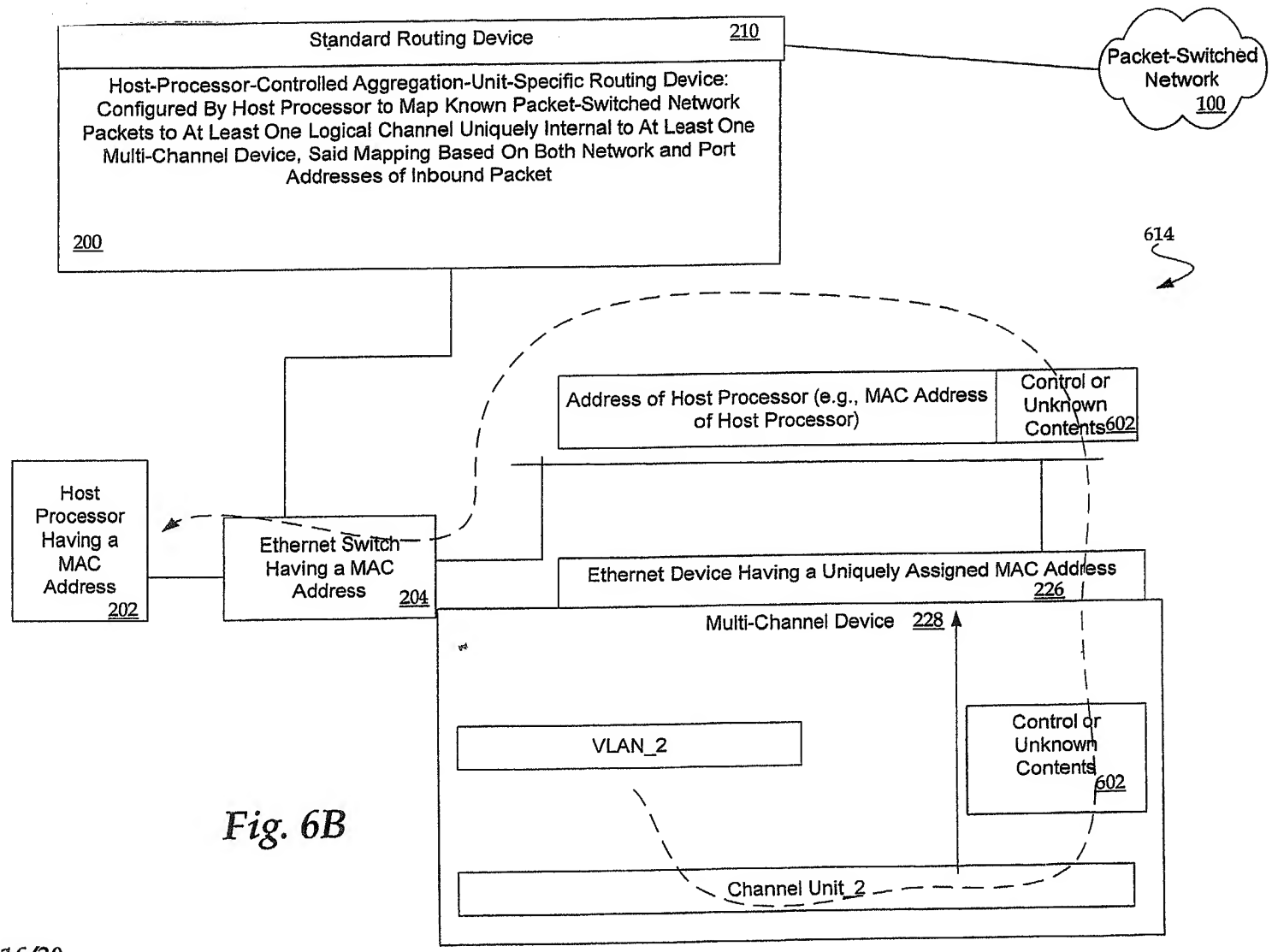

Standard Routing Device
210
Host-Processor-Controlled Aggregation-Unit-Specific Routing Device: Configured By Host Processor to Map Known Packet-Switched Network Packets to At Least One Logical Channel Uniquely Internal to At Least One Multi-Channel Device, Said Mapping Based On Both Network and Port Addresses of Inbound Packet
200
Packet-Switched Network
100
614
Address of Host Processor (e.g., MAC Address of Host Processor)
Control or Unknown Contents
602
Host Processor Having a MAC Address
202
Ethernet Switch Having a MAC Address
204
Ethernet Device Having a Uniquely Assigned MAC Address
226
Multi-Channel Device
228
VLAN_2
Control or Unknown Contents
602
Channel Unit_2

Fig. 6B

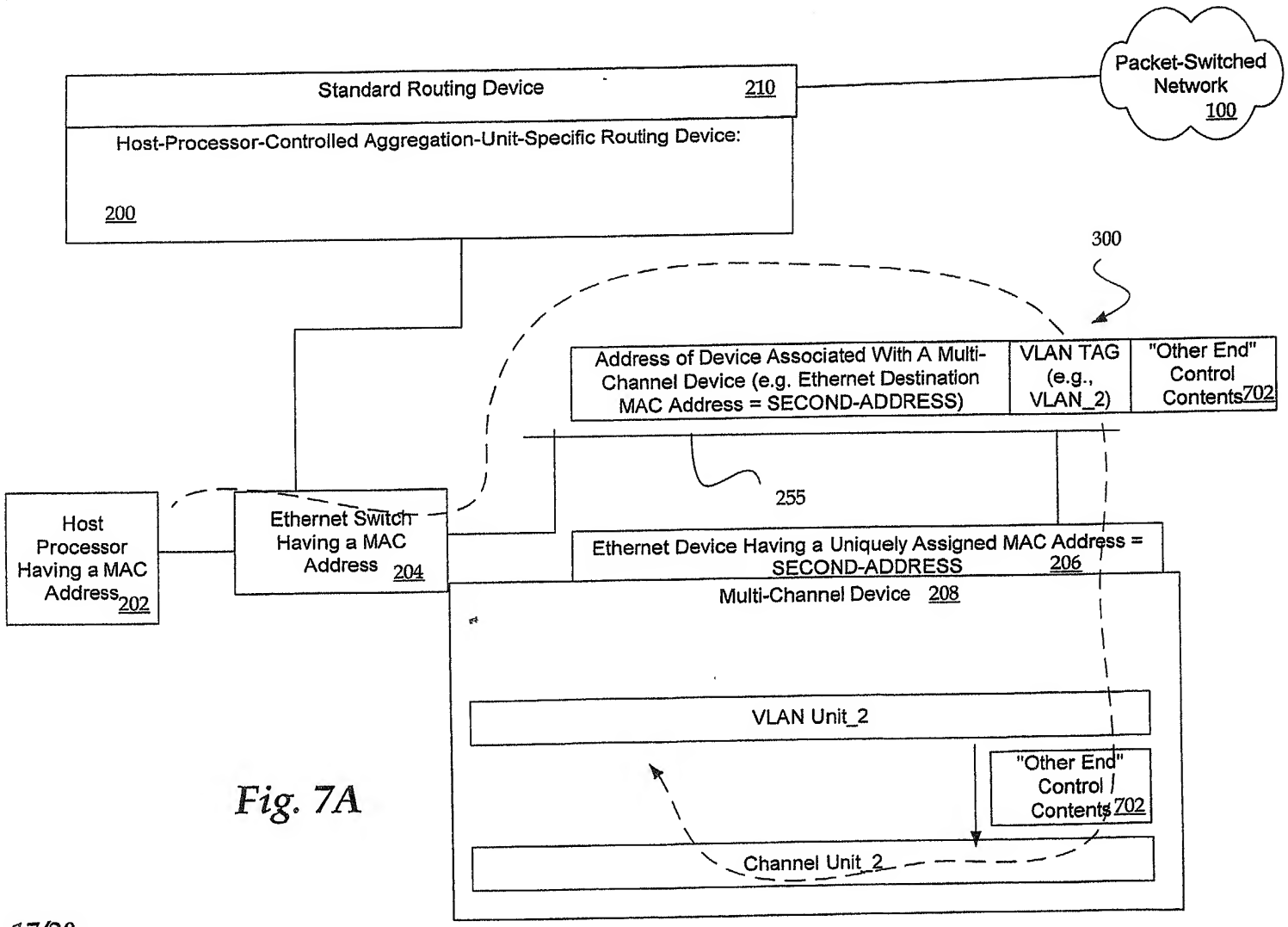


Fig. 7A

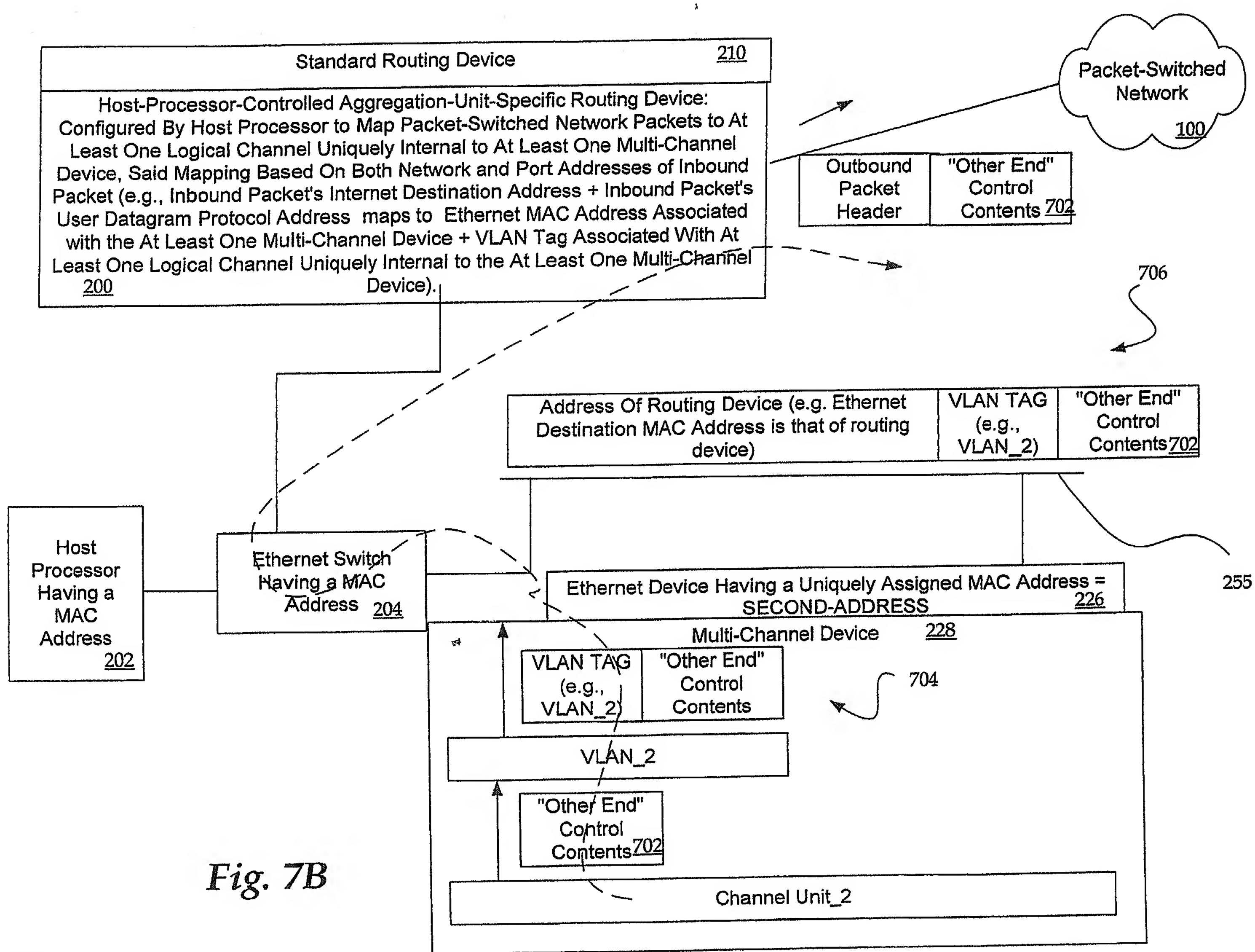

Standard Routing Device 210
Host-Processor-Controlled Aggregation-Unit-Specific Routing Device: Configured By Host Processor to Map Packet-Switched Network Packets to At Least One Logical Channel Uniquely Internal to At Least One Multi-Channel Device, Said Mapping Based On Both Network and Port Addresses of Inbound Packet (e.g., Inbound Packet's Internet Destination Address + Inbound Packet's User Datagram Protocol Address maps to Ethernet MAC Address Associated with the At Least One Multi-Channel Device + VLAN Tag Associated With At Least One Logical Channel Uniquely Internal to the At Least One Multi-Channel Device).
200
Packet-Switched Network
100
Outbound Packet Header
"Other End" Control Contents 702
706
Address Of Routing Device (e.g. Ethernet Destination MAC Address is that of routing device)
VLAN TAG (e.g., VLAN_2)
"Other End" Control Contents 702
Host Processor Having a MAC Address 202
Ethernet Switch Having a MAC Address 204
255
Ethernet Device Having a Uniquely Assigned MAC Address = SECOND-ADDRESS 226
Multi-Channel Device 228
VLAN TAG (e.g., VLAN_2)
"Other End" Control Contents
704
VLAN_2
"Other End" Control Contents 702
Channel Unit_2

Fig. 7B

Fig. 8A

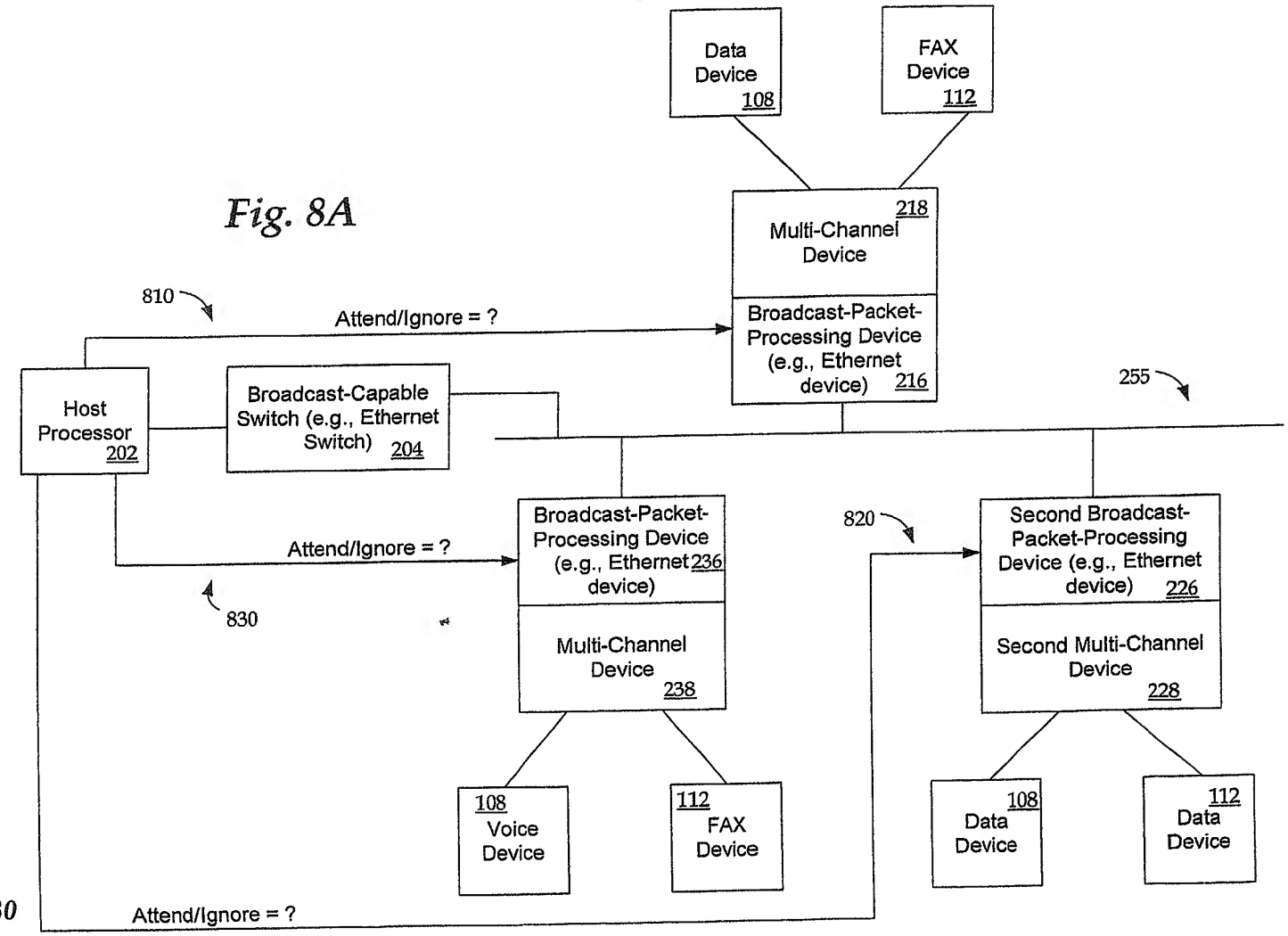

Data Device 108
FAX Device 112
Multi-Channel Device 218
Broadcast-Packet-Processing Device (e.g., Ethernet device) 216
810
Attend/Ignore = ?
Host Processor 202
Broadcast-Capable Switch (e.g., Ethernet Switch) 204
255
Broadcast-Packet-Processing Device (e.g., Ethernet device) 236
Multi-Channel Device 238
Attend/Ignore = ?
830
820
Second Broadcast-Packet-Processing Device (e.g., Ethernet device) 226
Second Multi-Channel Device 228
108 Voice Device
112 FAX Device
108 Data Device
112 Data Device
Attend/Ignore = ?

Fig. 8B

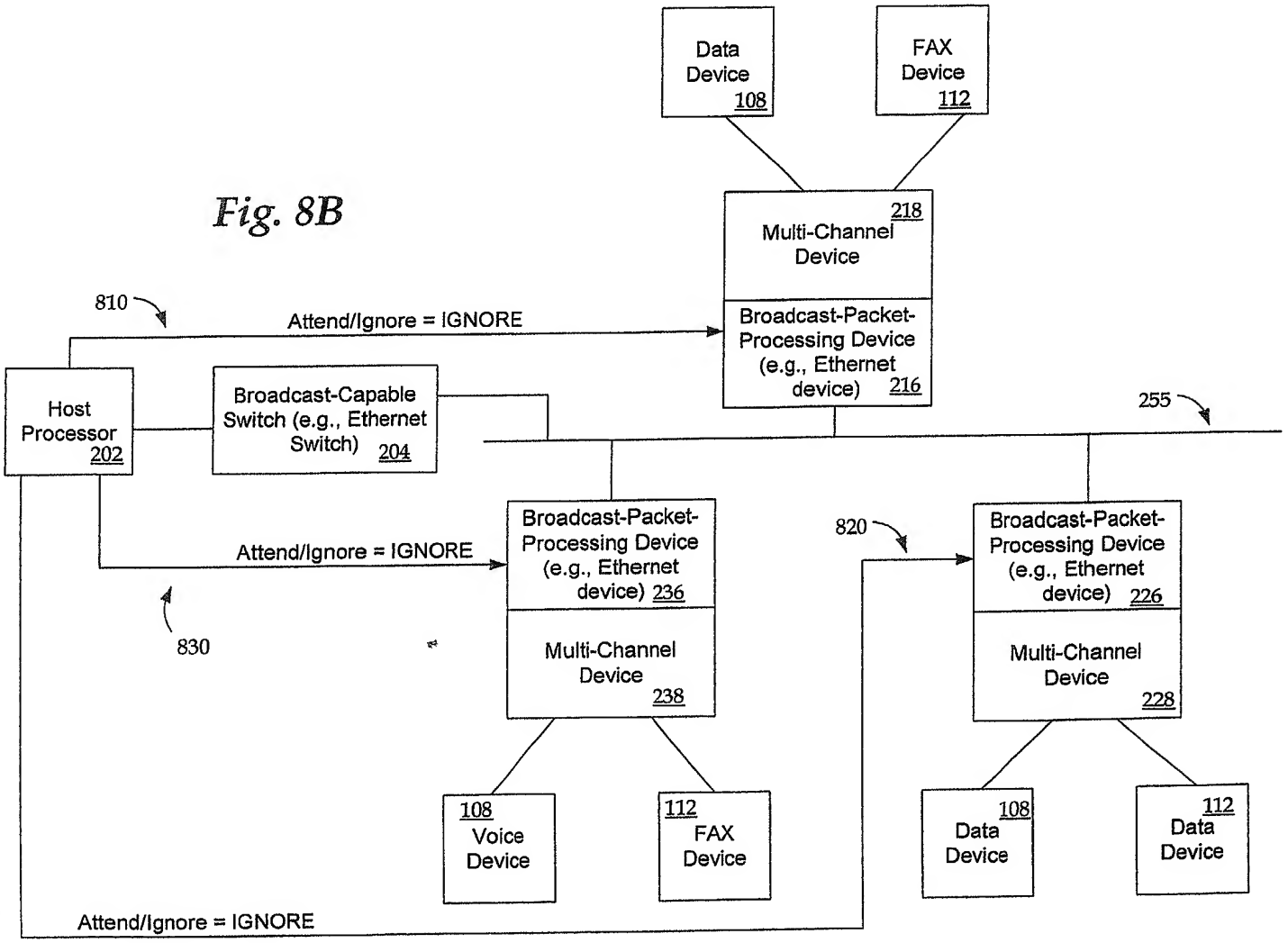
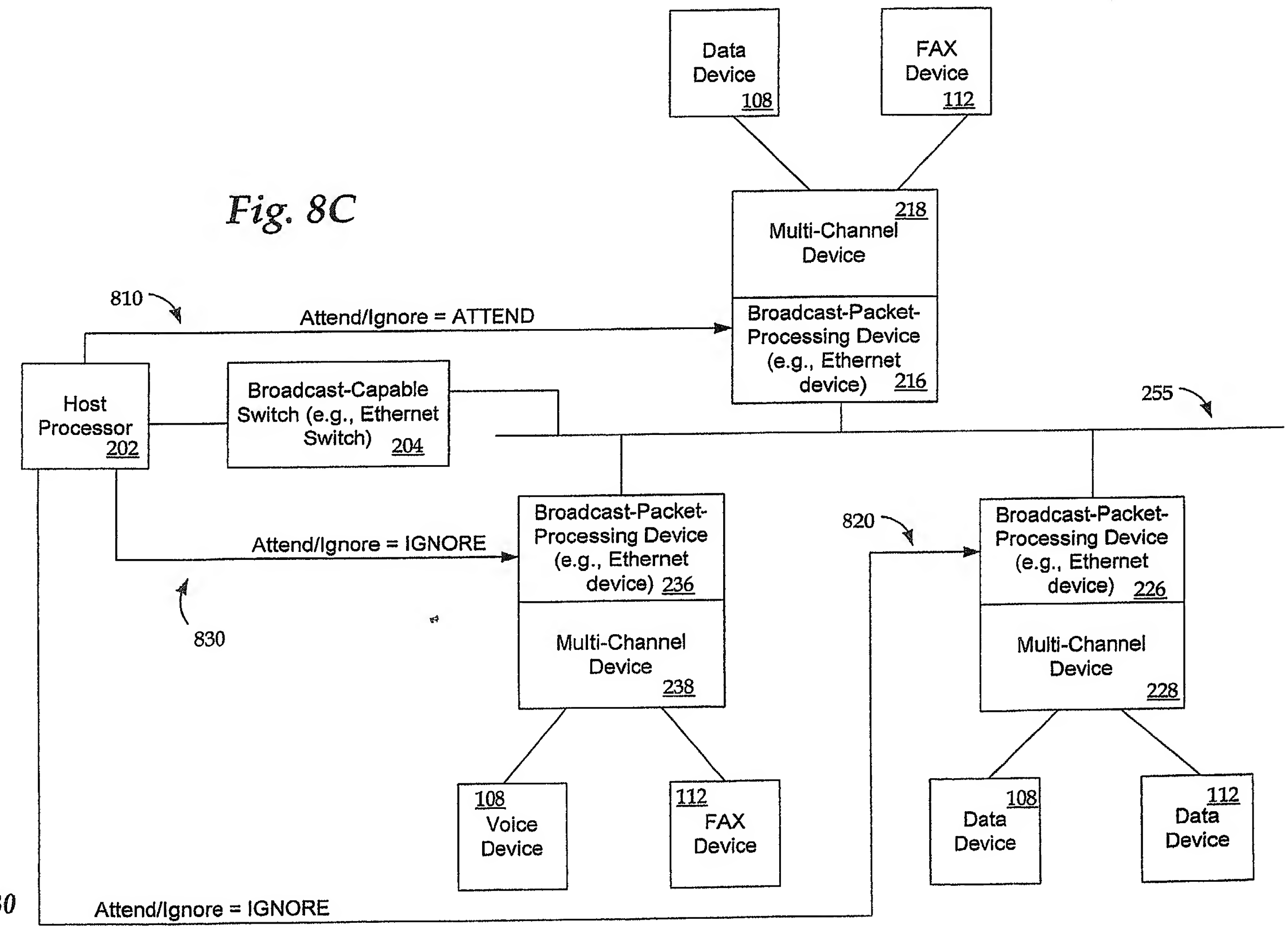

Data Device 108
FAX Device 112
218
Multi-Channel Device
Broadcast-Packet-Processing Device (e.g., Ethernet device) 216
810
Attend/Ignore = IGNORE
Host Processor 202
Broadcast-Capable Switch (e.g., Ethernet Switch) 204
255
Broadcast-Packet-Processing Device (e.g., Ethernet device) 236
Multi-Channel Device 238
820
Broadcast-Packet-Processing Device (e.g., Ethernet device) 226
Multi-Channel Device 228
Attend/Ignore = IGNORE
830
108 Voice Device
112 FAX Device
108 Data Device
112 Data Device
Attend/Ignore = IGNORE

Fig. 8C


Data Device 108
FAX Device 112
Multi-Channel Device 218
Broadcast-Packet-Processing Device (e.g., Ethernet device) 216
810
Attend/Ignore = ATTEND
Host Processor 202
Broadcast-Capable Switch (e.g., Ethernet Switch) 204
255
Attend/Ignore = IGNORE
830
Broadcast-Packet-Processing Device (e.g., Ethernet device) 236
Multi-Channel Device 238
820
Broadcast-Packet-Processing Device (e.g., Ethernet device) 226
Multi-Channel Device 228
108 Voice Device
112 FAX Device
108 Data Device
112 Data Device
Attend/Ignore = IGNORE

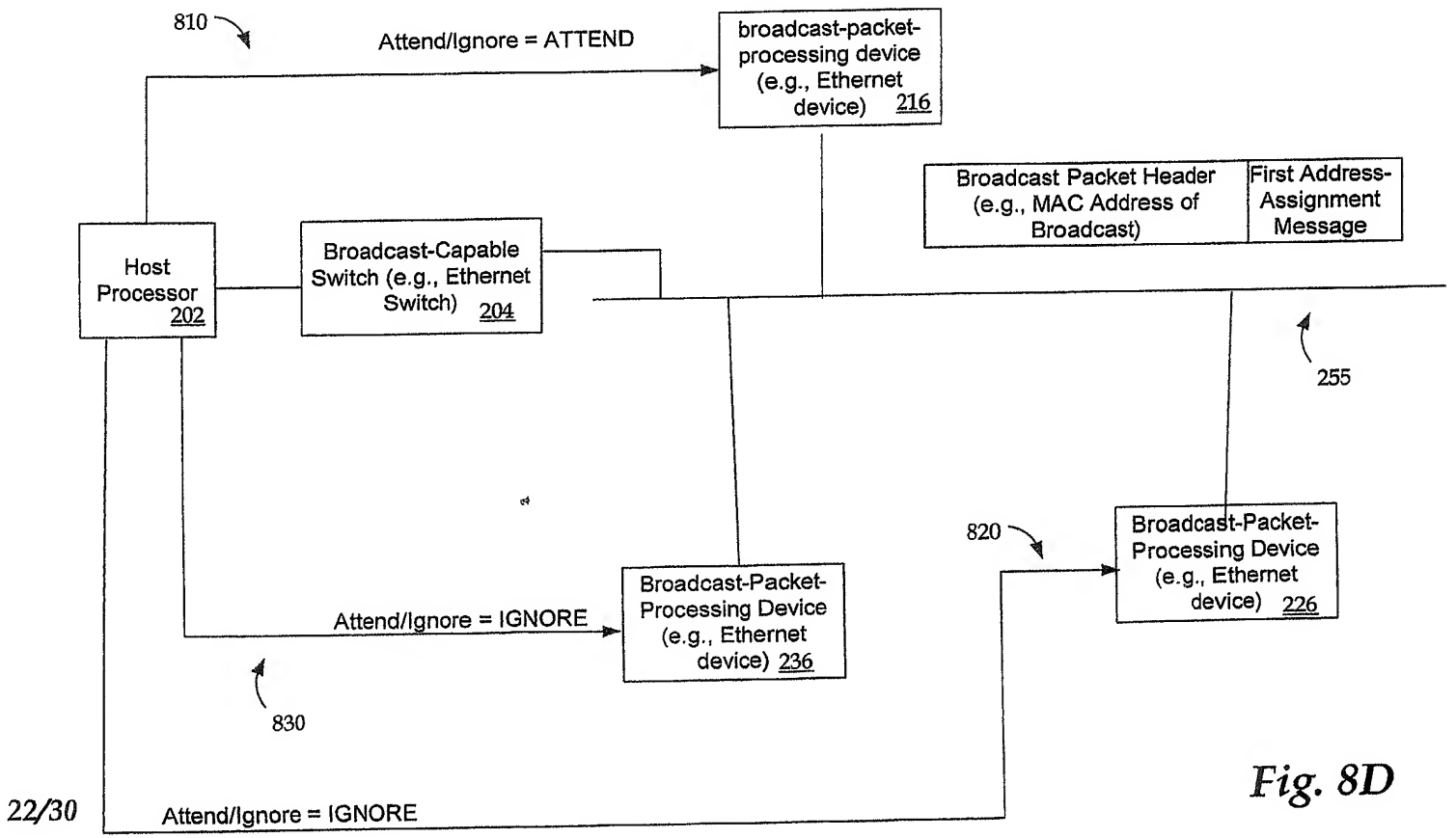

810
Attend/Ignore = ATTEND
broadcast-packet-processing device (e.g., Ethernet device) 216
Broadcast Packet Header (e.g., MAC Address of Broadcast)
First Address-Assignment Message
Host Processor 202
Broadcast-Capable Switch (e.g., Ethernet Switch) 204
255
820
Broadcast-Packet-Processing Device (e.g., Ethernet device) 226
Attend/Ignore = IGNORE
Broadcast-Packet-Processing Device (e.g., Ethernet device) 236
830
Attend/Ignore = IGNORE

Fig. 8D

Fig. 8E

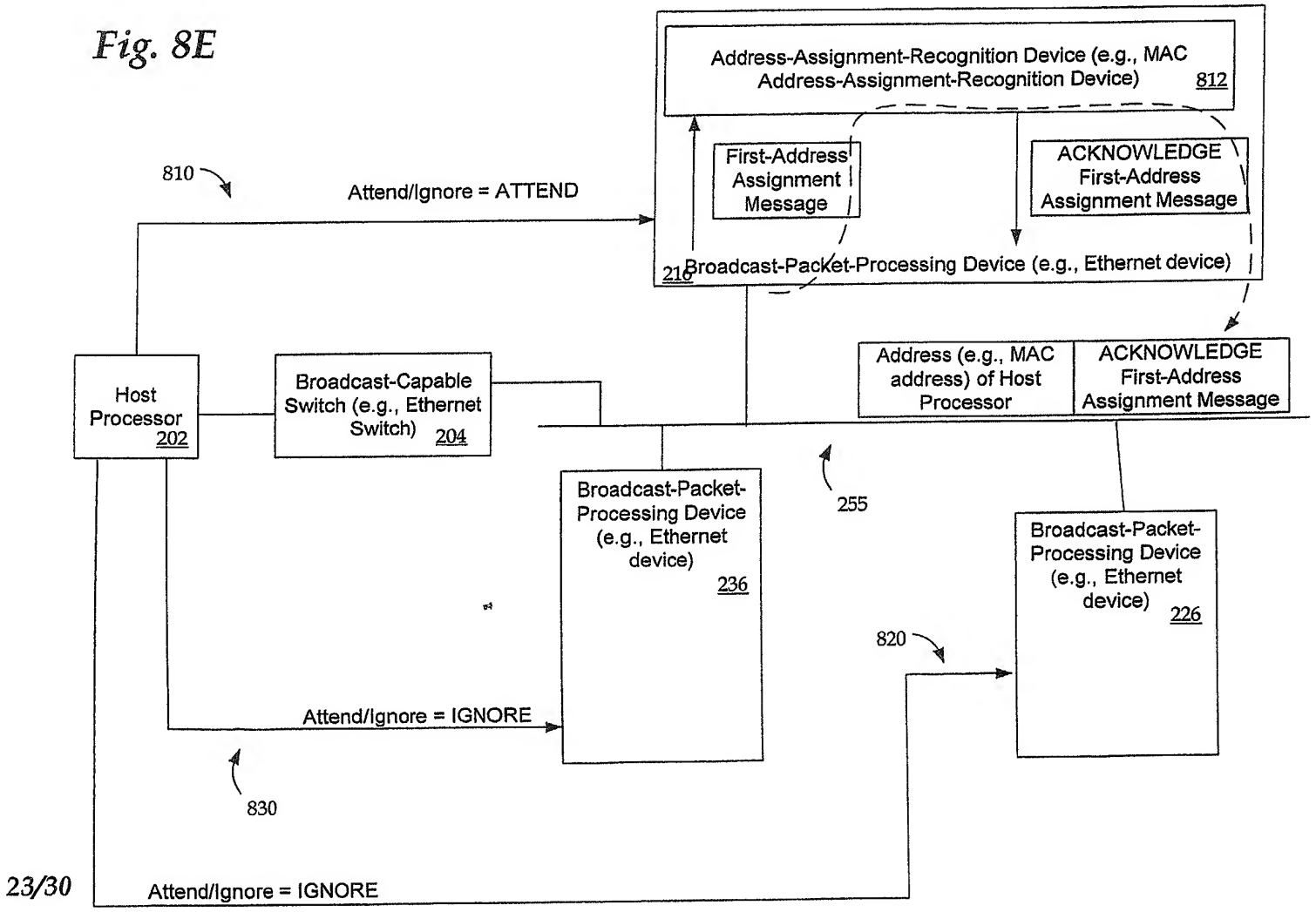

Address-Assignment-Recognition Device (e.g., MAC Address-Assignment-Recognition Device) 812
First-Address Assignment Message
ACKNOWLEDGE First-Address Assignment Message
216
Broadcast-Packet-Processing Device (e.g., Ethernet device)
810
Attend/Ignore = ATTEND
Host Processor 202
Broadcast-Capable Switch (e.g., Ethernet Switch) 204
Address (e.g., MAC address) of Host Processor
ACKNOWLEDGE First-Address Assignment Message
255
Broadcast-Packet-Processing Device (e.g., Ethernet device) 236
Broadcast-Packet-Processing Device (e.g., Ethernet device) 226
820
Attend/Ignore = IGNORE
830
Attend/Ignore = IGNORE

Fig. 8F

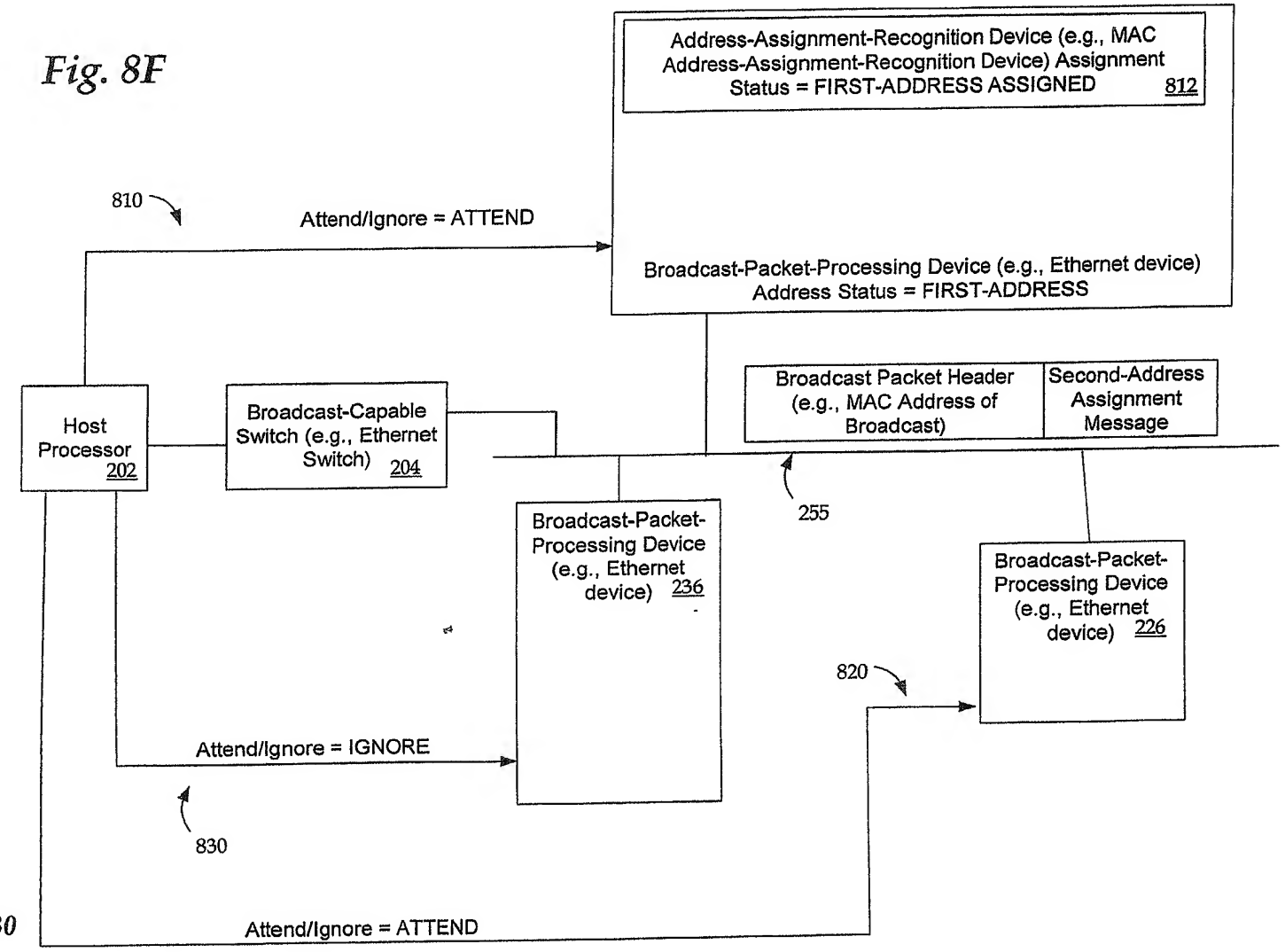

Address-Assignment-Recognition Device (e.g., MAC Address-Assignment-Recognition Device) Assignment Status = FIRST-ADDRESS ASSIGNED 812
810
Attend/Ignore = ATTEND
Broadcast-Packet-Processing Device (e.g., Ethernet device) Address Status = FIRST-ADDRESS
Broadcast Packet Header (e.g., MAC Address of Broadcast)
Second-Address Assignment Message
Host Processor 202
Broadcast-Capable Switch (e.g., Ethernet Switch) 204
255
Broadcast-Packet-Processing Device (e.g., Ethernet device) 236
Broadcast-Packet-Processing Device (e.g., Ethernet device) 226
820
Attend/Ignore = IGNORE
830
Attend/Ignore = ATTEND

Fig. 8G

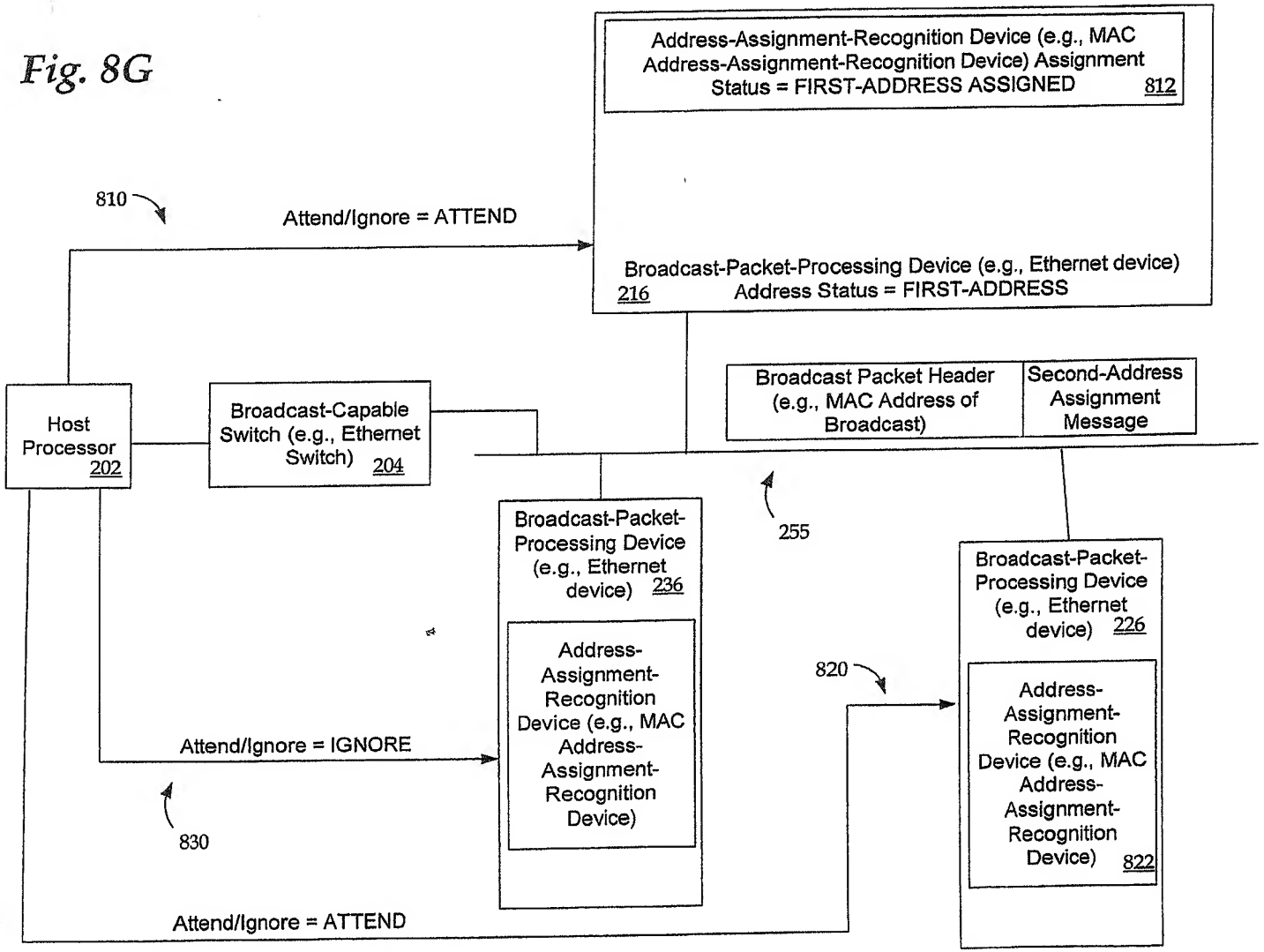

Address-Assignment-Recognition Device (e.g., MAC Address-Assignment-Recognition Device) Assignment Status = FIRST-ADDRESS ASSIGNED 812
810
Attend/Ignore = ATTEND
Broadcast-Packet-Processing Device (e.g., Ethernet device) 216
Address Status = FIRST-ADDRESS
Broadcast Packet Header (e.g., MAC Address of Broadcast)
Second-Address Assignment Message
Host Processor 202
Broadcast-Capable Switch (e.g., Ethernet Switch) 204
255
Broadcast-Packet-Processing Device (e.g., Ethernet device) 236
Address-Assignment-Recognition Device (e.g., MAC Address-Assignment-Recognition Device)
Broadcast-Packet-Processing Device (e.g., Ethernet device) 226
820
Address-Assignment-Recognition Device (e.g., MAC Address-Assignment-Recognition Device) 822
Attend/Ignore = IGNORE
830
Attend/Ignore = ATTEND

Fig. 8H

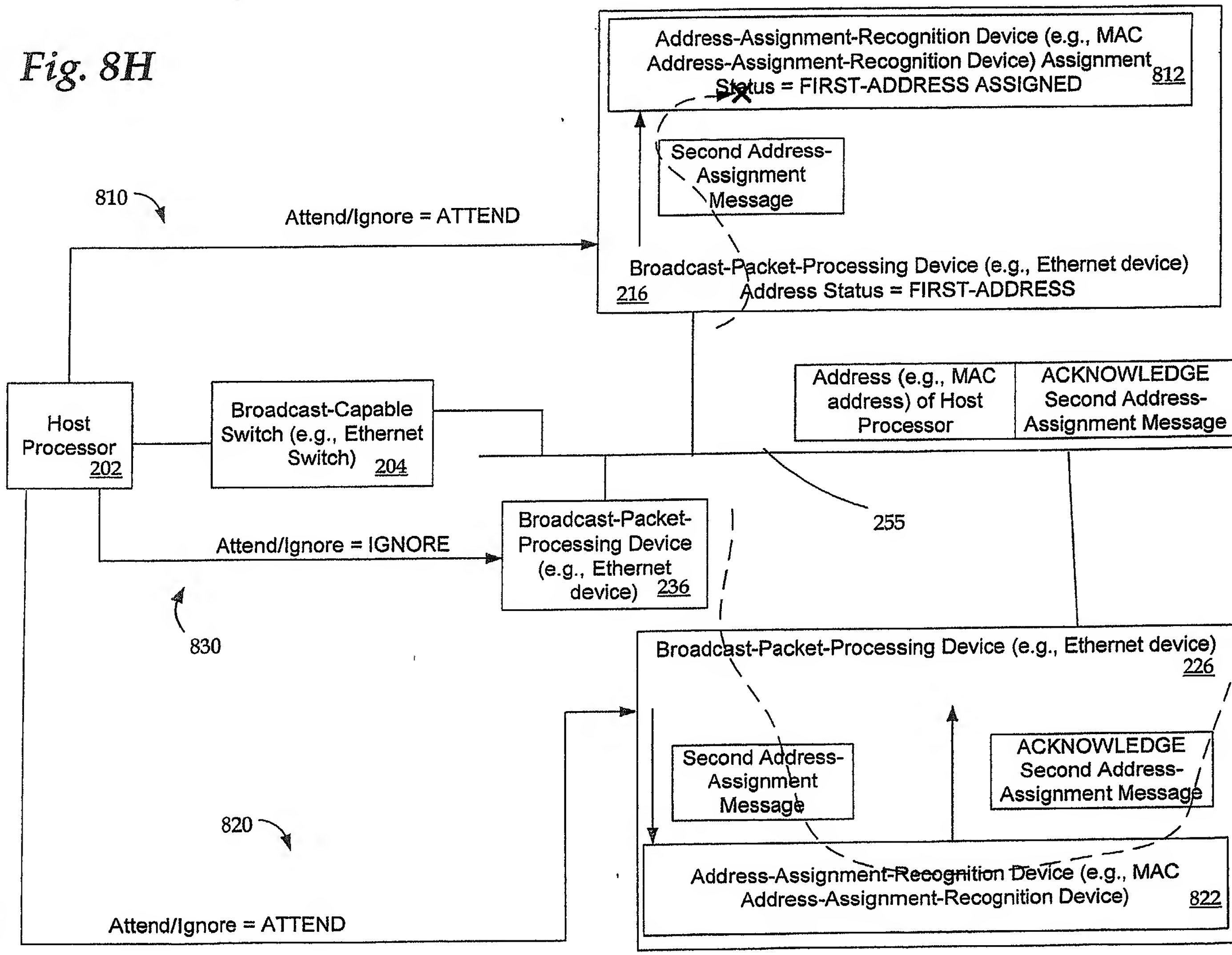


Fig. 8I

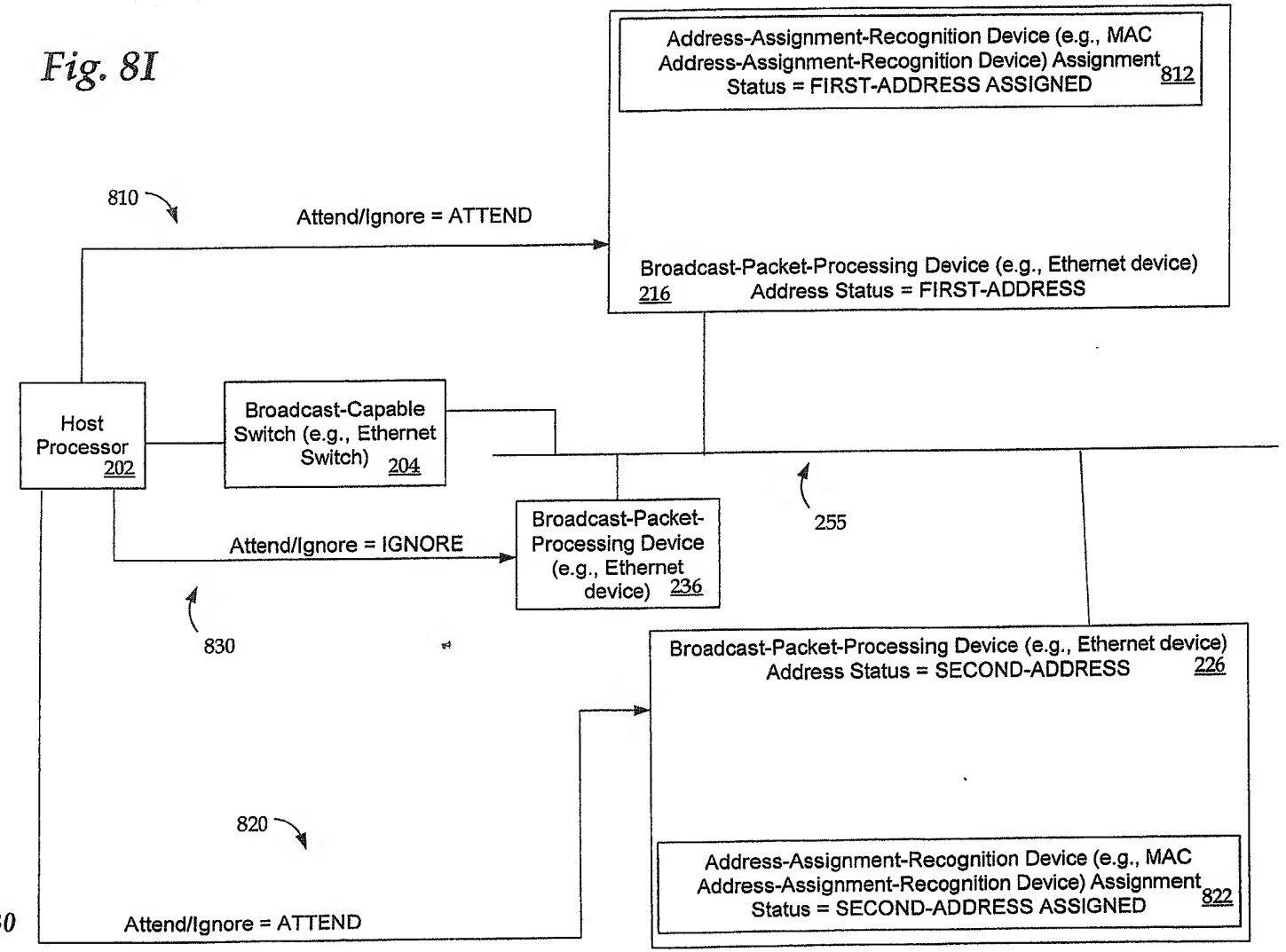

Address-Assignment-Recognition Device (e.g., MAC Address-Assignment-Recognition Device) Assignment Status = FIRST-ADDRESS ASSIGNED 812
810
Attend/Ignore = ATTEND
Broadcast-Packet-Processing Device (e.g., Ethernet device) 216
Address Status = FIRST-ADDRESS
Host Processor 202
Broadcast-Capable Switch (e.g., Ethernet Switch) 204
255
Attend/Ignore = IGNORE
Broadcast-Packet-Processing Device (e.g., Ethernet device) 236
830
Broadcast-Packet-Processing Device (e.g., Ethernet device) 226
Address Status = SECOND-ADDRESS
820
Address-Assignment-Recognition Device (e.g., MAC Address-Assignment-Recognition Device) Assignment Status = SECOND-ADDRESS ASSIGNED 822
Attend/Ignore = ATTEND

Fig. 8J

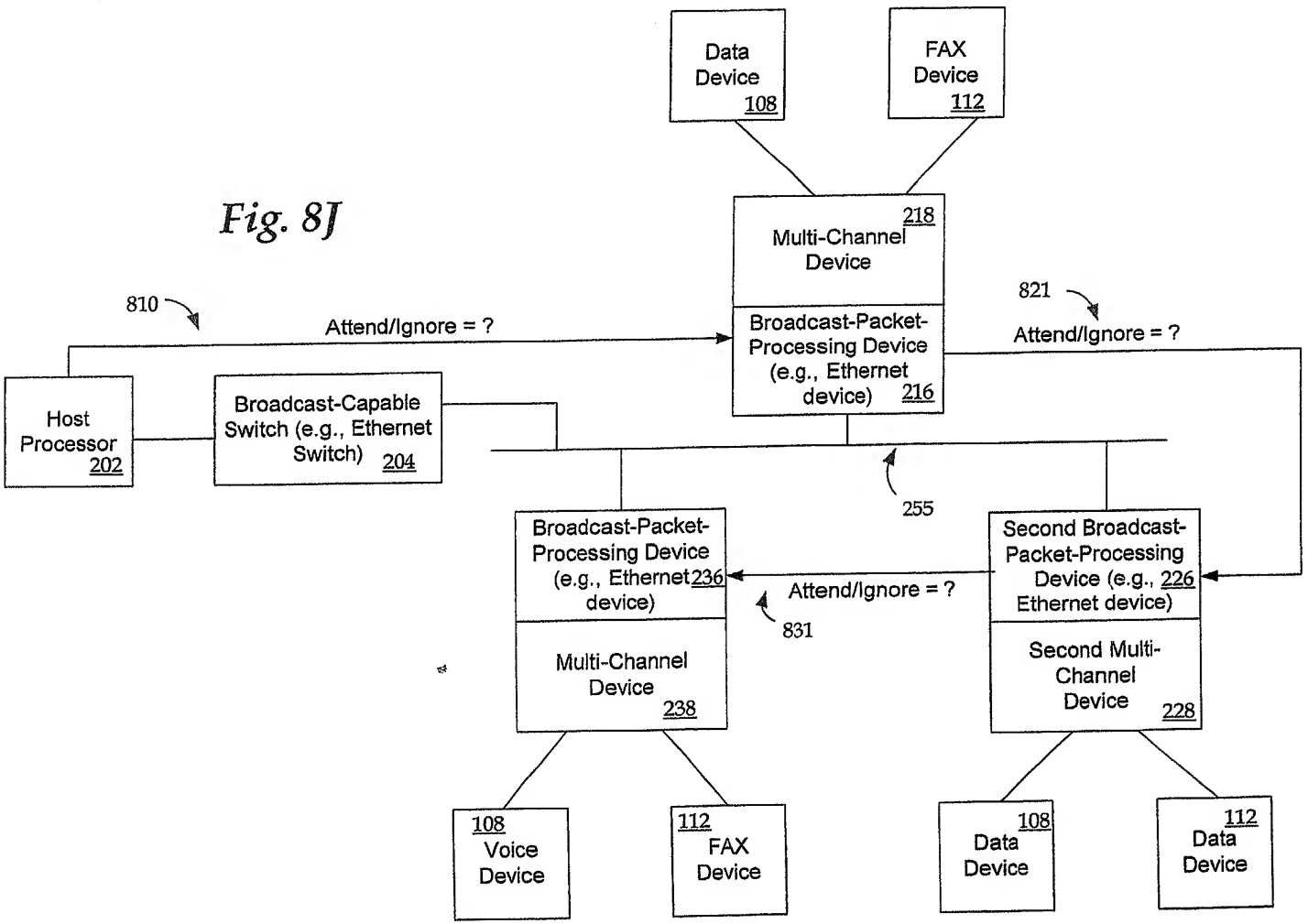

Data Device 108
FAX Device 112
218
Multi-Channel Device
Broadcast-Packet-Processing Device (e.g., Ethernet device) 216
810
Attend/Ignore = ?
821
Attend/Ignore = ?
Host Processor 202
Broadcast-Capable Switch (e.g., Ethernet Switch) 204
255
Broadcast-Packet-Processing Device (e.g., Ethernet device) 236
Attend/Ignore = ?
831
Second Broadcast-Packet-Processing Device (e.g., Ethernet device) 226
Multi-Channel Device 238
Second Multi-Channel Device 228
108 Voice Device
112 FAX Device
108 Data Device
112 Data Device

Fig. 9A

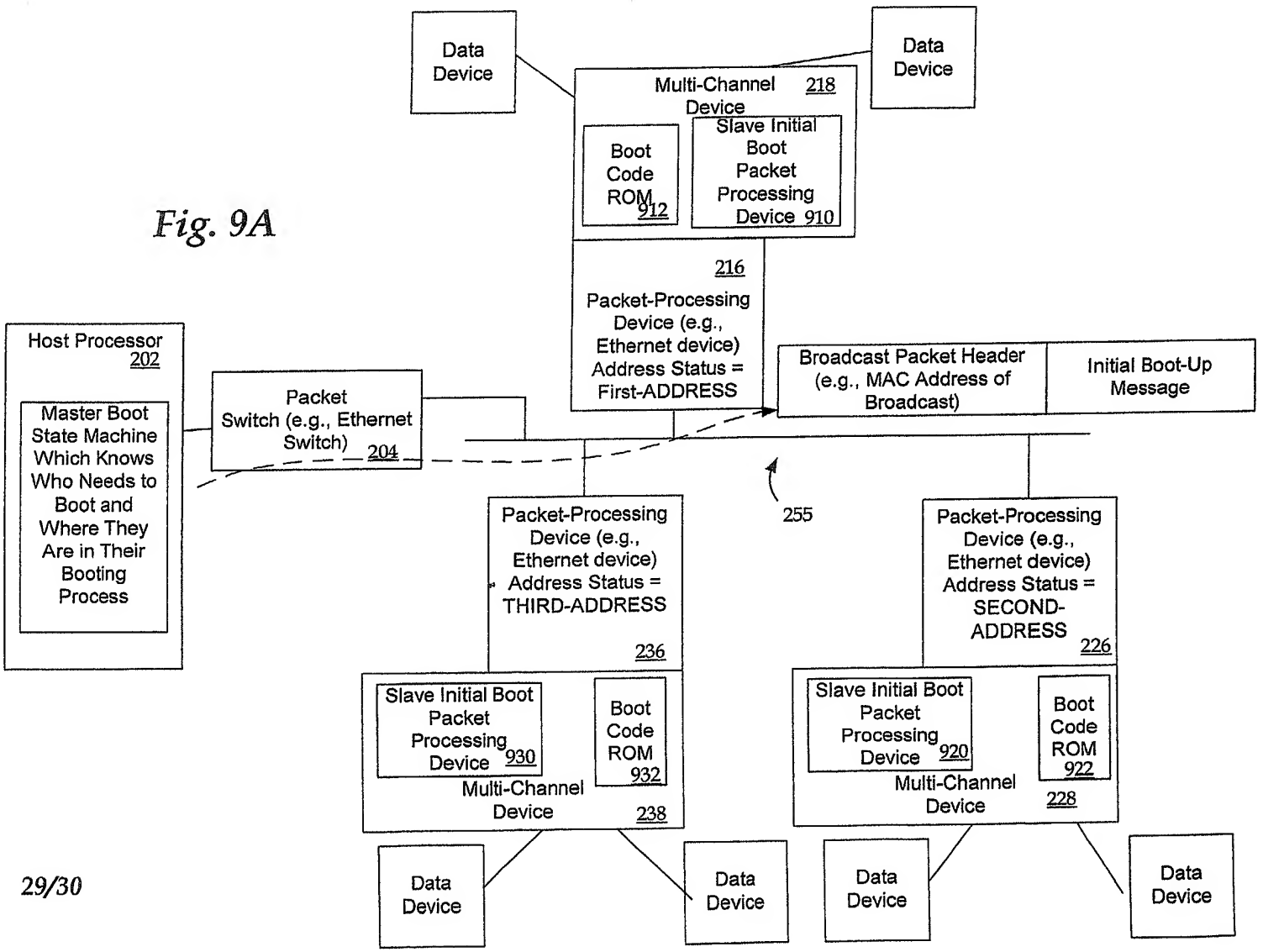
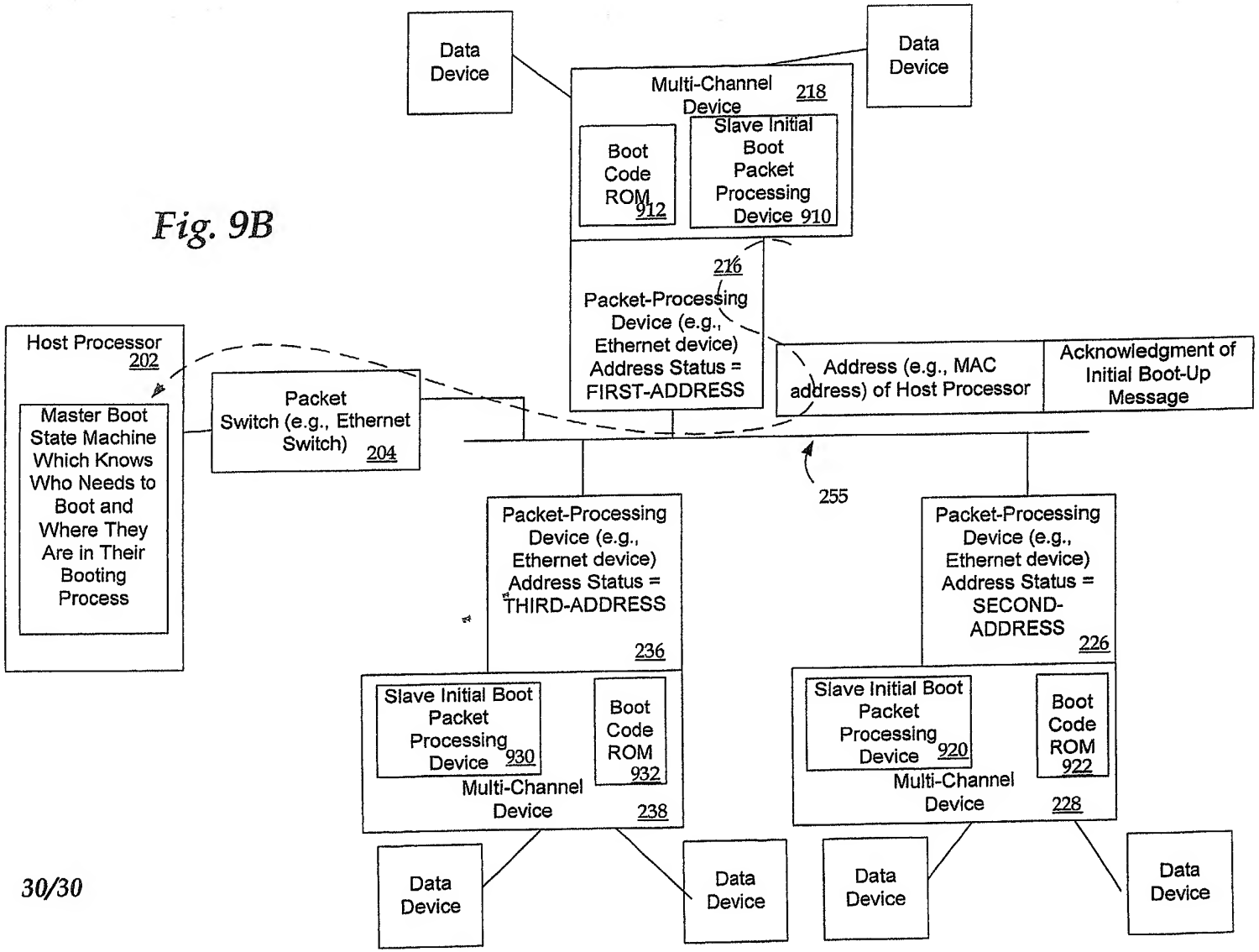

Data Device
Data Device
Multi-Channel Device 218
Boot Code ROM 912
Slave Initial Boot Packet Processing Device 910
216
Packet-Processing Device (e.g., Ethernet device) Address Status = First-ADDRESS
Host Processor 202
Master Boot State Machine Which Knows Who Needs to Boot and Where They Are in Their Booting Process
Packet Switch (e.g., Ethernet Switch) 204
Broadcast Packet Header (e.g., MAC Address of Broadcast)
Initial Boot-Up Message
255
Packet-Processing Device (e.g., Ethernet device) Address Status = THIRD-ADDRESS 236
Packet-Processing Device (e.g., Ethernet device) Address Status = SECOND-ADDRESS 226
Slave Initial Boot Packet Processing Device 930
Boot Code ROM 932
Multi-Channel Device 238
Slave Initial Boot Packet Processing Device 920
Boot Code ROM 922
Multi-Channel Device 228
Data Device
Data Device
Data Device
Data Device

Fig. 9B


Data Device
Data Device
Multi-Channel Device 218
Boot Code ROM 912
Slave Initial Boot Packet Processing Device 910
216
Packet-Processing Device (e.g., Ethernet device) Address Status = FIRST-ADDRESS
Address (e.g., MAC address) of Host Processor
Acknowledgment of Initial Boot-Up Message
Host Processor 202
Master Boot State Machine Which Knows Who Needs to Boot and Where They Are in Their Booting Process
Packet Switch (e.g., Ethernet Switch) 204
255
Packet-Processing Device (e.g., Ethernet device) Address Status = THIRD-ADDRESS 236
Packet-Processing Device (e.g., Ethernet device) Address Status = SECOND-ADDRESS 226
Slave Initial Boot Packet Processing Device 930
Boot Code ROM 932
Multi-Channel Device 238
Slave Initial Boot Packet Processing Device 920
Boot Code ROM 922
Multi-Channel Device 228
Data Device
Data Device
Data Device
Data Device